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THE MONIST

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THE MONIST

WHAT REMAINETH?

> "That the things unshaken may remain."
> —*Hebrews* xii. 27.

RECENTLY I received a letter from a distinguished minister in a foreign land, a letter that impressed me deeply. He had given great attention to the Jesus-question for a number of years and had become finally and entirely convinced of the essential correctness of the radical or symbolic interpretation of the Gospel story, and in particular of the unhistorical character of its central figure. He had tried hard to keep his own conversion out of the pulpit, to inhibit or restrain its influence on his preaching and his pastoral ministrations, but in vain. Despite his utmost efforts he found that it colored his speech and his life, that he was no longer the same man but undisguisably another. To him the change was a great uplift and illumination, and to his flock in general it seemed not unwelcome; they heard him gladly and were ready to follow whither his thought might lead. Not so with the "rich deacons," the officers, and the representatives of the "vested interests" in the church.[1] Of these the opposition seemed irreconcilable. In particular they insisted that with the vanishing of Jesus as an historical character the whole structure of the faith passed away with a great noise, that "there was nothing left whatever." Accordingly they tighten their purse-strings, they refuse support to a Christianity which they declare has been voided of all its content, and it is not strange that the worthy minister finds himself in a deplorable plight. One thing is certain: he will not compromise his convictions in any measure. He will not tamper with the truth as he now sees it clearly, but will abide the consequences with the firmness of a Luther. All honor to such a hero of the New Reformation!

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[1] An early reviewer of *Ecce Deus,* discussing the work very sympathetically in a Tokio publication, predicted that the author's view, though logically and historically correct, could not prevail against the hostility of the "vested interests."

At first sight one might feel inclined to sympathize with the wealthy members of this congregation and to ask in all seriousness, What remains of Christianity when the historical character of the Jesus is surrendered? Some time ago an illustrious British philosopher, who had been deeply impressed by reading *Der vorchristliche Jesus,* who had written me that he was more and more persuaded that "the view of the Christian *origines*" (therein set forth) was "in the main on right lines," who had indeed expounded that view in an address before a certain society, on reading *Ecce Deus* wrote to me again, in a mood of apparent unrest. He could see no way to adapt the conception of proto-Christianity, as a monotheistic crusade, to the condition of the present age; what message or meaning could such a Christianity have for us, who are born monotheists? All the inspiration, the enthusiasm, the significance of the Gospel proclamation seems to evaporate in the presence of an audience long since convinced, to whom it is nothing new or strange, but a mere truism, who never saw an idol and never expect to see one.

It cannot be gainsaid that there is much force in such considerations, especially these latter of the metaphysician. But the force is by no means logical, it is weakly and even absurdly sentimental. It is a queer objection to proto-Christianity that it has accomplished its mission, that it has converted the civilized world to the recognition of the One God, that its Gnosis has celebrated a complete triumph, that it has utterly overthrown every resistant form of idolatry and has fulfilled to the letter the proud prediction concerning its apostles, that Satan (false worship) should fall like lightning from heaven before them. The world has in fact been *saved* by this glad Evangel from the fearful sin of idolatry, the sin from which it promised salvation. What more could be expected? A patient is sick and nigh unto death; a wise physician appears and applies a healing drug that saves the sufferer's life and cures his malady completely. What then? The cure being effected, the drug is no longer needed. Shall we now reject the physician and belittle his drug because it heals no longer when there is no longer anything to heal? Surely not. It is very true that the "Eternal Gospel" of monotheism may fail to stir the depths of the present already monotheistic consciousness; but in the beginning it was not addressed to any such, but on the contrary to a consciousness intensely, exclusively, and often fanatically polytheistic. This monotheistic Gospel was precisely the one and the only conceivable one to arouse, excite, enchain, enthrall, and finally completely overcome and transform that polytheistic consciousness. It is the height of unreason to suppose that the greatest religious reformation the world has ever known should not have been aimed directly against the one great religious error of the day, the one thing religious that needed reforming. There was then a positive necessity that proto-Christianity, born in the Jewish Dispersion, should be a protest against idolatry, a crusade for the worship of the One God; it could be nothing else than a "Gospel everlasting to preach unto the dwellers upon earth and to every nation and tribe and tongue and people, saying with a mighty voice, Fear God and give Him glory" (Rev. xiv. 6-7). All the conditions of the time not only favored but even demanded such a proclamation, hence its immense and incomparable success. But the very completeness of the success, by its total transformation of all the conditions of the case, does indeed disqualify the oldest Gospel to be at the same time the newest, to be the desiderated Gospel of to-day. Yet all this argues no fault in that earliest Evangel, quite the contrary; the Evangel was perfectly fitted to its time and clime.

It is clear, then, as the noonday that it is an utter lapse in logic to carp at the radical interpretation of primitive Christianity because the occupation of such Christianity is gone for the West of to-day. It is not the function of radical criticism to provide a faith that shall meet the aspirations of the twentieth-century European-American, as the early monotheistic preaching met those of the Græco-Roman nineteen hundred years ago. It is the function of that criticism to make the past intelligible, to reduce the experience of our fathers (so far as it lies discovered in testimonies of this kind and of that) to order and to acknowledged law, and so to carry forward the greatest task that human thought sets for itself, of attaining a unity of the spiritual universe. The look of that criticism is turned not forward but backward, not upon the ages to come but upon the ages gone, though its ultimate goal is of course the perfect realization of the Eternal Spirit. Accordingly the radical critic does not forget To-morrow in his study of Yesterday, which he must see clearly and see whole. If proto-Christianity (as revealed by the new criticism) be alien or unequal to the demands of the hour, that may be the best of reasons for transcending it by some Neo-Gospel, some new morn risen upon its waning light; but it is no reason at all for rejecting the revelations of that criticism or depreciating their significance or embarrassing their dissemination.

All this seems so self-evident that the writer feels ashamed to insist upon it; is it not a waste of words to enforce such truisms at such length? Certainly, if it were not likewise sadly true that the prevailing theory and practice are exactly the opposite. The age is pragmatic and disposed to accept as true only that which works; though the philosopher in question has dealt most telling blows at theoretical pragmatism, he has unconsciously fallen into its trap, and would object to the radical view of the early Gospel that such a Gospel would not work well to-day! In presence of such a judgment in such a quarter, one is not surprised that the great multitude of such as are willing to think at all on the subject are altogether impatient of the critical processes that compel one to the radical view and are ready to settle the question by asking, "How would such a view affect the minds of to-day? Would it work well in social and commercial life, in preaching, in charity, in organization? If not, then it is not for us, no matter what may be the critical evidence in the case." This is somewhat like, though far worse than, saying, "Is the value of the circummetric ratio, π, as a transcendental irrational, readily manageable in the calculations of engineering? If not, then we will have not of it, no matter what the mathematicians may say; the value $^{22}/_{7}$ is good enough for us." Yet without this transcendental value of π, inexpressible in any closed form, we could never have an *exact* algebra, metric geometry, or trigonometry, to say nothing of higher mathematics; all of which lie out of the view of the true pragmatist. The foregoing waste of words has then been necessary, if only to detain the reader and force him to consider the matter.

We may now advance a step and ask the question, What in truth remains of current Christianity on acceptance of the certain critical result, the non-historicity of the Jesus? The first and most obvious answer is that *proto-Christianity remains,* the Christianity of the first and part of the second century, the Christianity of the Apostles, of the early missionaries, even of the great Gnostics,—and let it not be forgotten that with the illustrious Clement of Alexandria (150-220) the "perfect Gnostic" and the perfect Christian are the same. If any one denies this, well and good, the issue is immediately joined; "to the law and the testimony." We are at once upon the critical terrain, where we like to be, where and where alone such matters must be debated and adjudged. Only be it remembered that it is solely a question of evidence, that only logical canons are admitted, and that the verdict of the testimony in the case is to be accepted as final, along with all its necessary consequences, be they what they may. Of course, in this brief paper no full presentation of the evidence can be attempted; some of it is already set forth in *Der vorchristliche Jesus* and in *Ecce Deus* and in writings pertaining thereto; but not nearly all. In this connection it is practicable only to call attention to a few outlying and also outstanding facts additional to those mentioned in the works just named, especially to the commanding facts of the *Teaching* and the *Shepherd.*

Of these the first is the oldest known manual of Christian doctrine and practice. Of course, like nearly all such writings, it is a compilation, but a very old one, nearly all of it is earlier than the second century, and much of it dates back into the first, some of it perhaps even beyond. Its testimony is therefore of the highest value, it is unimpeachable, and it is unequivocal. Now the *Teaching* knows nothing whatever of any human or historical *Jesus.* Aside from three or four obvious interpolations, the name itself is unknown to this ancient and revered "Doctrine of the Apostles." Besides, the whole tenor and spirit of the document shows that it did not proceed in whole or in part from a consciousness informed with the idea of an historical Jesus, such as reigns in modern Christian dogma and is supposed to be present in the New Testament Scriptures. This celebrated *Didachē* reveals and presents the earliest

Apostles as quite independent of any such notion as the modern assumes to have been the very pivot and hinge, the kernel and the essence of apostolic preaching. Herewith indeed the modern assumption is utterly exploded, but it is the argumentative value of the *Teaching*, not in relation to the Jesus-question, that now concerns us, but only in relation to the question of the *value* of the alleged historical character in the early apostolic preaching. Even if we were to cling fast to the disputed historicity (as Bousset does), we should yet have to admit (with Bousset in his *Kyrios Christos*) that its value was practically zero in that early preaching, even of Paul and of James and the New Testament worthies in general. The demonstration then is overwhelming, that the human-historic Jesus did not figure appreciably in the glorious first preaching of the Gospel.

If now we pass to the *Shepherd* of Hermas, we find this conclusion not so much corroborated as demonstrated decisively, independently, and anew. The *Shepherd* may be dated somewhere between 95 and 135, near the beginning of the second century. It proceeds from Rome, from the heart of the Christian consciousness of that day; it was almost a vade-mecum of the two centuries following its birth, one of the most popular of early Christian works; it was highly esteemed, even as inspired and authoritative, by the best minds of the Church, as by Origen; its value as a book to be read was conceded even by such as denied it to be canonical (e. g., the author of the Muratorian Fragment); true, it was rejected by Tertullian and such, but for the reason, irrelevant to the present discussion, that it was too forbearing in treatment of sexual irregularities. Now this *Pastor* of Hermas never mentions the name Jesus, it never hints at a Gospel incident, it knows apparently nothing whatever of the supposed Gospel history, it makes not the least use whatever of the supposed fundamental and indispensable *motif* of the exemplar life, of the historical figure, of the human Jesus. Remember, too, that this *Poimen* is distinguished among early Christian writings by its great length, surpassing that of any Gospel, and it appears past controversy that the *motif* in question could not have bulkt sensibly in that early Christian consciousness of Rome at the beginning of the second century of our era.

If now we turn to the New Testament itself, we find that a number of its documents even in their present interpolated form are yet entirely innocent of the debated historicity. The Epistle of "James, Servant of God and the Lord Jesus Christ" stands at the head of the General Epistles, yet it hints nothing whatever concerning the central historic-human figure of the modern faith; such a figure has no apparent existence for this James, though he has been supposed to have been the "Brother of the Lord." Similarly, in the "Revelation of Jesus Christ which God gave him," which "I John" beheld and reported, ascribed to the "beloved disciple" and especial intimate of the "Carpenter of Nazareth," there is no allusion at all to the New Testament story, no hint of any kind at the human-historic character in question. Yet this important document, however complex and uncertain its origin, does undoubtedly mirror the early Christian consciousness with extraordinary vividness, especially as it prevailed among the Messianists, whom great critics (like Conybeare) and eschatologists in general regard as the *very earliest of all Christians.*[2] And in this testimony the Jesus is exclusively a divine being with no suggestion of human history. Such an impressive phenomenon may well have been painful to some later historizing Catholic, who has tried to relieve the situation by inserting at xi. 8, after "the great City," the words, "which is called spiritually Sodom and Egypt, where also their Lord was crucified." An interpolation could hardly be more patent. "Revelation" reveals an intensely Jewish consciousness, yet here the "holy city" of verse 3 is called "Sodom and Egypt," which betrays a mind just as intensely anti-Jewish. — In the Epistle "To Hebrews" we also find a Christian consciousness for which the Jesus is a divine being, for which the human-historic counts extremely little, if indeed it be not altogether absent. The few vague and scanty suggestions of this latter element are very probably mere marginal observations of later copyists or of more deliberate falsifiers in the interest of the "historic" dogma.

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[2] "It (Christianity) was at first a Messianic movement among Jews": Conybeare's *The Historical Christ*, p. 74. See the present writer's review of this work in *The Open Court*, March, 1915, pp. 163-189.

The like may be said of many other phrases and clauses lying loose in the context of the Epistles, which may be easily shaken out by a light breath of criticism. They were inserted in the body of a text that originally knew nothing of the human-historic Jesus, with intent to catholicize the document, to adapt it to the later biographic dogma that has thus intruded itself and finally elbowed nearly everything else out of the Christian doctrine.[3]

The contention does not indeed seem extravagant that the whole body of earliest Christian writings, until interpolated as aforesaid, was free from any trace of influence of the human-historic Jesus. And in this connection it is worth while to remark that it is now admitted in such a recent and authoritative work as *The Problem of the Fourth Gospel,* by H. Latimer Jackson, D.D. (Cambridge University Press), that this greatest of the Gospels is a free work with no pretension of conformity to modern standards of history and biography, a "spiritual" or mystical "Gospel" imparting the new truth in symbols, "preserving the spiritual meaning in what one may venture to call bodily falsehoods" (says Origen). Herewith this Gospel vanishes from the scene as a witness to "the historic Jesus." Yet it is by far the most seeming-historic of the four Gospels, it employs much the largest number of biographic minutiæ, it strives to produce by all odds the most vivid picture of a living breathing flesh-and-blood personality. And yet it is confessedly allegory, its testimony is null! How much more, then, the Synoptics, which omit nearly all such finer biographic touches and sketch a divine figure in a few bold strokes of the brush, where the symbolism lies plain at hand and there is far less attempt to produce an historic illusion!

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[3] The writer has devoted several elaborate memoirs to the exposition of the foregoing propositions, and these he hopes to publish as soon as "the star of peace returns," and the public eye and ear may be caught by some other literature than that of the War.

Turn, then, which way you will, it becomes clearer and clearer that the human-historic element is either practically or totally absent from the earliest Christian literature and therefore from the earliest Christian consciousness, of which that literature is a fairly faithful reflection. We may therefore repeat with all emphasis our earlier thesis, that the vanishing historicity leaves all proto-Christianity behind it. We may reject the human-historic element and still be as true Christians as those first so called at Antioch.

Not for an instant does the writer imagine that this result will be found satisfactory, no matter how well assured. It looks like juggling with words to say that primitive Christianity abides when its center and focus disappears as a human-historic figure. But it is not. The reason for this false appearance is that we forget what a rapid and prodigious growth befell the earliest teaching under the excessive hot-house culture of the highly composite and adventurous circummediterranean mind of the early Christian centuries. That mind positively rioted in endless excursions in every direction in the wide-opened fields of religious-philosophic fancy; the plant of dogma grew up and branched and budded and bloomed in amazing fashion;

what is far more, it was engrafted with alien shoots from distant gardens, shoots that struck deep root in the native stem and spread out into overshadowing foliage. Like an immense Banyan tree this new nurture of an ancient stock has stretched itself abroad over the whole terrain of our emotional and intellectual life. And yet in spite of this world-shadowing outgrowth and ingrowth, the primitive germ was simple and familiar: it was the Oneness of God, a Jewish faith preached to a Gentile world. The immeasurable excrescence and increscence were both perhaps historically necessary and intelligible, but they no longer serve any useful purpose; nay more, they serve to divert and absorb countless streams of energy, which can ill be spared from other and far more important channels of diffusion. Only consider the mountainous up-piling of theological books and pamphlets and periodicals, practically all of which are *dispensable.* We have no quarrel with such at present, but the authors themselves must know in their secret hearts that such works are of supererogation, they have little or no meaning for the present or the future. The like may be said of the multitude which no man can number of soporific sermons addressed to somnolent congregations every Sunday from Eastern Russia to Western California. That they signify nothing is made clear by the contrast with Billy Sunday. The preachers, conscious that they themselves are only sounding brass and tinkling cymbals, go in throngs to sit at the feet of this notorious mountebank, hoping to learn something from the tricks of a faker, to catch holy fire from the eruptions of a "movie" volcano!

However, all such general considerations will still be found inconclusive, such is the immovable mountain of eighteen centuries of prejudice before us! Who shall say unto it, "Be thou removed hence and cast into the sea"?

But at least let us come to close quarters and ask in how far is the current faith, the faith of to-day, dependent upon the alleged historic-human figure of Jesus? In answering this question it may be best to consider the so-called "Apostles' Creed" (*symbolum apostolicum,* an ancient expansion of a still more ancient baptismal confession, which every one knows and concedes was not due, but unknown, to the Apostles) and examine its articles in detail;—of course, we cannot touch upon the learned questions of the provenience of this creed, the birth of three centuries, or of its relations to the Roman Creed, the Creed of Antioch, and others.

I (a) "I believe in (one) God the Father Almighty, Maker of heaven and earth." This calls for no comment; it is the monotheistic dogma and has nothing to do with the Jesus.

I (b) "And in Jesus Christ his only Son our Lord." In this the Jesus appears only in his divine character as Son and Lord, the human-historic is not yet present. The notion of the "Son-of-God" is extremely old, pre-Christian by many centuries, appearing in countless forms and phases of meaning. It is quite out of the question to attempt any discussion of this vague and fluent idea in this connection; it must suffice to state that the notion in no way whatever implies the dogma of a human-historic Jesus; any one rejecting this dogma may still affirm this article in just as good faith and honesty as any one accepting the dogma.

II (a) "Who was conceived by the Holy Ghost, (b) Born of the Virgin Mary; (c) Suffered under Pontius Pilate, (d) Was crucified, dead and buried; (e) He descended into hell, (f) The third day he rose (again) from the dead; (g) He ascended into heaven, (h) And sitteth on the right hand of God the Father Almighty; (i) From thence he shall come to judge the quick and the dead." This second article, with its nine sub-articles, is the distinctively deutero-Christian contribution to this Apostles' Creed, it summarizes and makes precise the quasi-historic element as this gradually took shape in the Christian mind of the second and third centuries under the stress of conflict between the Gnostic and the Catholic parties. It is the stratified precipitate of centuries of the most daring speculation and the most subtle and often acrid controversy. It represents the final triumph of the literalists, of the historic and materialistic over the symbolic and spiritualistic interpreters. Its generations of authors have succeeded in making its statements verbally precise and unequivocal, narrating a biography in familiar every-day terms. What they have failed to do is to put any *meaning* into the words they have used. After striking out the original symbolic and mystical or spiritual content, they have been unable to supply any other.

Let us test this assertion in detail.

(a) "Who was conceived by the Holy Ghost," (b) "Born of the Virgin Mary." As historical and biographical, such words have no discussable meaning whatever. It is vain to raise scruples dark and nice about parthenogenesis in certain lower forms of life, or about artificial fertilization of ova by saline solutions or other means. We may concede even human virgin birth as a physical possibility, but all such considerations are entirely irrelevant; certainly none such were in the minds of the authors of these articles of faith. There is no question of any physical process whatever; "who was conceived by the Holy Ghost, Born of the Virgin Mary." Such events are entirely beyond the range of modern imagination or speculation. It is impossible for us to attach to them any biographic or historic meaning whatever. Homer indeed tells of many a virgin that couched with a godhead immortal, but these blessed gods were only men and women of finer grain than the earth-born, who sipped ambrosia and nectar, in whose veins flowed ichor instead of blood: such a deity was easy enough to fantasy, and the poet's words held an imaginable meaning. And this is true even of his statement concerning the steeds of Achilles (*Il.*, 16, 149-151):

> "Xanthos and Balios, twain as a whirlwind rapid in running,
> Horses Podarge the harpy aforetime bore to the West Wind,
> Zephyros, while in a meadow she grazed by flood of the Ocean."

But no such imagination is for an instant permissible in the case in hand: no effort of the human understanding can assign any meaning to such a theological dogma.

Of course, this does not imply that the authors of the sentence, or at least of the accounts in Luke and Matthew, did not mean something definite enough when they first used such expressions (which assumed their oldest extant forms only very gradually, so that the primitive phrases are lost to us entirely). They were not formulating dogmas but writing poems, clothing spiritual truths in bodily falsehoods (as Origen would say). In attempting to give a sensible form to the notion of the Jesus-God as the "Son-of-God," they seized upon the methods and expressions lying at hand in the mythopoetic creations of the pagan world around them, and each embodied his own fancy in a story more or less after the Homeric or some other model; and this they did with perfect freedom and in utter disregard of the patent fact that their stories (in Matthew and Luke) contradicted each other at numerous and vital points, in fact are directly contrary in all the human-historic features, and most naturally, since both are pure and independent inventions, without the shadow of basis in fact. As such, they are perfectly intelligible and even beautiful; as historic narratives they are utterly inconceivable. It is not too much to say that there is no man in Christendom, whether Pope or Patriarch, whether Cardinal or Primate, whether clerk or layman, that associates any definite notion with these words, no matter how often or how vehemently he may repeat them; or if he does combine with them any definable notion, that notion is arbitrary and worthless, if not ridiculous. Worthless, for there is no worthy use of any kind to which such a notion could be put; it is of no avail to any rational being.

It is no new thing, nor peculiar to Christians, to profess words without ideas. The illustrious Maimonides (1135-1204) opens the fiftieth chapter of his *Guide of the Erring* with the reminder that "by 'faith' we understand not merely what is uttered with the lips, but also what is apprehended by the soul," and adds "you will find many ignorant persons professing articles of faith but connecting no idea with them." The faith of such a man is vain.

If any one thinks that the foregoing judgment upon these articles is too severe, and that there are deep thinkers who profess them intelligently and in all sincerity, the answer is that such philosophers can at best attach to them only some mystical meaning utterly foreign to the words themselves, and under the persuasion of necessity. But they might do the same thing to any senseless jumble of letters or other signs, as to *Abracadabra*, which one may wantonly understand to mean what one will. But such an arbitrary ascription will still not be the *meaning* of the signs in question; for *meaning* is not the wilful reaction of this or that mind merely to please itself, but the lawful, well-ordered, and regulated reaction of normal informed minds in general, in presence of the signs in question. Such being the case, the only way to give historic-biographic content to the articles in question is to fall back on the analogy of the saline solution; but surely no one would do this, and it would be hard to imagine a greater violence to the thoughts of this famous confession.[4]

(c) "Suffered under Pontius Pilate," (d) "Was crucified, dead and buried." These words in the modern acceptation merely continue conceivably the biography already inconceivably begun. Now it is remarkable that of all these four items (a, b, c, d) not one comes from the core and original cast of the Gospel. It is well known and generally conceded that the "prehistory" of the Birth etc., the first two chapters in Matthew and also in Luke, are later fanciful prefixes to the earlier Gospel, which began with John's Preaching in the Wilderness. So too the "Sufferings of the Christ" (τοῦ Χϱιστοῦ παθημάτων, 1 Peter v. 1), the Crucifixion, etc., are later suffixes to the same Gospel, which did not take Jesus into Judea, as Harnack now admits bravely and honestly, even in face of the serious inference suggested.[5] Whence came the notion of the "Sufferings," this is not the place to inquire; but of the Crucifixion we may say with some confidence that it came from the phrase found in Heb. vi. 6, "crucifying to themselves the Son-of-God and putting (him) to open shame." Here the words seem to refer to nothing but the public rejection (by the Jews?) of the "doctrine about the Son-of-God," "the Logos" (doctrine), which is the only subject under discussion in the context (Heb. vi. 1). The word (of the AV) "afresh" is not in the Greek (as now admitted in his translation by Moffatt); the prefix ἀνα- does not mean *again* but *up* (the setting-*up* of the cross), and besides in the original D-manuscript it was not present, but was afterward inserted in an impossible original position, at the end of a line. There is no allusion to any *re*-crucifixion, but

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[4] One must not forget, in appraising such documents, that the sharp distinction between mind and matter is comparatively modern and was not drawn even by the acutest theologians among the ancients. The Targum Onkelos

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(second century A. D.) was marked by the most labored and persistent attempts to smooth down anthropomorphisms and all corporeal features in the Old Testament representation of Yahveh, and Maimonides devotes a large part of his *Guide* to the praise of Onkelos and to an elaborate refutation of the current doctrines of the corporeality of God. Words that for us have lost all meaning and reference might well have been used in the early days of our era.

[5] *The Sayings of Jesus*: "....the Passion and the narratives and discourses leading up to the Passion were completely wanting in Q," "whose horizon is as good as absolutely bounded by Galilee," pp. 170, 171. Notice his alarm at "this extraordinary fact from which we cannot escape," p. 233 n.

the open rejection of the "doctrine about the Christ" or about Jesus (τὰ περὶ τοῦ Ἰησοῦ, Acts xviii. 25) is called "crucifying the Son-of-God," about the same as "pillorying," exposing to public derision, as the following phrase explains, "putting to an open shame." This notion of "rejection" as "crucifixion," hardly original with the author of Hebrews, but used by him as familiar to his readers, would seem to have been taken up and expanded into the story of the Crucifixion as found appended to the Synoptic Gospels and inwoven still more elaborately into the Fourth.[6] Since such seems to have been the primitive sense of the "crucifixion," it might be legitimate for any one to profess faith in this article in this its only true and proper historic sense, which statement, however, is no advice to any one to do so. The further specifications, "dead and buried," are mere corollaries from "crucified" taken in its literal and personal but improper sense. One may indeed speak of a doctrine as being "dead and buried," but such a use is not to be recommended and does no justice to the intention of the Creed-makers.

(e) "He descended into hell." This remarkable item of faith is entirely foreign to the Gospel. It might indeed be regarded as an inference (necessary for the ancient) from the Death; since the shade or soul of the deceased descended straightway beneath the broad disk of the earth into the house of Hades (i. e., hell). But the Scripture warrant is found in 1 Peter iii. 19, "in which (spirit) also he went and preached unto the spirits in prison," etc., and *ibid.* iv. 6, "For unto this end was the Gospel preached even to the dead" (though here the original reference might have been to the heathen dead in idolatrous sin). Of course, there is no primitive Christianity in such a doctrine, nor has it the least spiritual value for any intelligent

[6] Along with a number of others, the writer's memoir on "The Original Sense of the Crucifixion" is held back, awaiting the dawn of peace.

modern, though Dante could use it for high poetical purposes. It is rarely heard of in the speech of to-day; there are perhaps very few that ever think of it one way or another (though its content is not unthinkable), an alternative form is admitted for conscientious objectors, and little objection would perhaps be raised against him that would omit it altogether. Whether any meaning consistent with the non-historicity of the Jesus could be ascribed to such words, it seems idle to imagine. (See Note B, at close.)

(f) "The third day he rose from the dead." Here indeed we seem to touch the nerve of the whole matter. The Resurrection (*Anastasis*) on the third day is regarded on nearly all hands as the main pivot of the Christian faith and hope. And yet there are very many that shrink from understanding these words in their obvious sense. It is a hard task to believe that the body of the Crucified, after having lain from Friday eve till Saturday eve, or Sunday morn, truly dead in the grave of Joseph, was then resuscitated and delivered from the tomb and walked about on the earth alive for forty days. In the presence of this article the faithful man may indeed exclaim, "Lord, I believe; help thou mine unbelief." Of course, there have been many silly attempts to rationalize the resurrection story by imagining a case of suspended animation and premature interment; all such puerilities are entirely unworthy of notice. The notion of the *Anastasis* is one of the oldest and most important in proto-Christianity, but it did not at first mean *again-setting* (*re*-surrection) but *up*-setting i. e., setting-*up, establishing*), a most frequent sense of the Hebrew equivalent *qûm,* as Maimonides testifies (*Guide,* I, xii: "It is always in this sense that the verb is used in referring to the Almighty"). The earlier phrase "God hath raised (or set) up the Jesus" (like the kindred sentence, "David who was raised on high, the Messiah of the God of Jacob," 2 Sam. xxiii. 1) referred to the *establishment* of the Jesus as Deity, i. e., to the revelation of God himself *as the Jesus,* i. e., in the *person* or character of Jesus or *Saviour* (i. e., from *sin,* the one supreme sin of idolatry). So the doctrine of the Establishment (Anastasis) is equivalent to the universal proclamation of God as the One God of all men, i. e., to Christian monotheism, and hence is fundamental and vital in primitive Christianity. It has nothing to do with the human-historic Jesus and hence is unaffected by the vanishing of this latter. To believe in the *Anastasis* is simply to recognize the historic fact that under the name, in the person, of the Jesus (the Saviour from the sin of idolatry) the One God was preached in the first centuries of our era with astonishing and complete success, a belief which the radical would be the first to profess. The modern doctrine of the Resurrection, or resuscitation of the body of the Crucified, is a stumbling-block to the conscientious and is without religious or any other merit.[7]

(g) "He ascended into heaven, (h) And sitteth on the right hand of God the Father Almighty." These articles declare the Ascension and Enthronement of the Jesus. It has long been familiar to critics that these were not really different from the Resurrection. They are only further and more explicit statements of the *Anastasis* or *establishment* or *installation* of the Saviour-God Jesus, i. e., the manifestation of God as the Saviour (of the world) from polytheism. Such was surely the original sense of the preaching at this point. What has been said on the resurrection article applies with full force to the ascension and enthronement articles and need not be repeated.

(i) "From thence he shall come to judge the quick and the dead." In the Old Testament the wrath of God is directed peculiarly if not solely against the sin of idolatry.

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[7] This matter is set forth sufficiently in the essay on "Anastasis" in *Der vorchristliche Jesus.* For significant appropriations, see W. Bousset's work *Kyrios Christos.*

Apostles' Creed falls into three parts: the first of these falls into two articles, of which the first proclaims a pure monotheism acceptable to Jew, proselyte, and enlightened pagan, while the second proclaims the distinctive Christian addition, but with no suggestion of a human-historical Jesus. Precisely here in all probability the earliest Christian creed had its end. To so much and no more the Book of Acts bears witness and the New Testament in general. When the Philippian jailer fell trembling at the feet of Paul and crying, "What must I do to be saved?" the answer was, "Believe on the Lord Jesus, and thou shalt be saved, thou and thy house," his simple conversion from polytheism was enough for *all*. Such was certainly the central idea of the new movement, which alone makes it intelligible. It is quite impossible to think of the Apostles' converts as professing anything like the Apostles' Creed (of seventeen articles!). All the evidence in the case, as well as common sense, indicates that the primitive creed was at most of two articles. Such indeed has long been the contention of the Disciples, Reformers, "Campbellites," *Christians* (as they call themselves), one of the most militant and crescent of the newer denominations, who in their earlier days displayed a keen insight along with extraordinary logical vigor, but of late would seem to suffer from arrested development, perhaps owing to lack of nurture of higher knowledge.

The second section of this creed is obviously a much later elaboration. It attaches itself by the relative "who" to the preceding and presents in quasi-historic *caricature* the symbolic-poetic investiture of the early teaching, along with certain accretions necessary to complete the historization. The whole section is a corruption of the second and third centuries and is without any authority for the enlightened Christian conscience, but it has blurred some beautiful features of the primitive "new doctrine."

The third section is likewise late, but is mainly ecclesiastic and practical, without special or necessary reference to the doctrine of the Jesus whether human or divine.

Dismissing the Creed with this cursory examination, we pass to the more general question, What must be the effect, on moral, spiritual, extra-creedal Christianity, of the radical criticism in rejecting a human-historical Christ? The answer does not seem to be especially difficult. *Ethics,* it seems, would not be affected at all. Its demands rest upon no particular authority but in the nature of the spiritual universe, upon the common universal conscience as it grows, develops, clarifies, fortifies, and sanctifies itself in the process of the eons. The wisdom of Egypt and of India, of Athens and of Jerusalem is not a fetter laid upon the soul; nay "the words of the wise are as goads" that spur us onward, they are stimulus and inspiration, they are rungs in the Jacob's ladder of ascent to heaven. The starry sentences of the New Testament shine undimmed by the fact that we do not know who was the author of a single one. The case is the same with Isaiah and with Homer, with Moses and with Plato, with Euclid and with Apollonius. No one knows the genesis of any particular form of thought or expression. The most beautiful hexameter was perhaps an ancient saw. It is the catholicity, the universal appeal, that makes canonical and authoritative. No human-historic Jesus could give any binding force to any maxim or doctrine. This will perhaps be generally conceded. A *divine* Jesus might indeed do so, but that question is not now before us. As a matter of fact, there is nothing past-human in the New Testament. Neither in theory nor in practice are there any peculiarly Christian virtues, though certain virtues, the gentler, more passive, more feminine, have received peculiar stress both relatively and absolutely, in the theory and the practice of Christians.

The truth is that the Christian propaganda was in first line religious rather than ethical, though of course the ethical element was by no means neglected. By their fruits ye shall know them. Outsiders must judge of such a movement mainly by its consequences in conduct, and the high moral standard of the proto-Christians, with uncommon accent[9] on the tenderer graces of character, undoubtedly contributed immensely to the success of their crusade. Nevertheless, their ethical theory was certainly defective at certain points, and under the complex conditions of modern life it is often vain to appeal to the New Testament, whether for inspiration or for guidance, though such appeal is continually made, and texts are distorted beyond recognition, not in the exposition, but in the imposition, of meanings. Such as it is, however, the New Testament and Christian morality loses nothing whatever at the disparition of the human-historic Jesus.

But some one will say, "Alas! the example, the matchless model, the inspiration of a perfect life! All this is ruthlessly snatched away by the radical criticism, and men are left helpless in their misery, like sheep without a shepherd, scattered upon the mountains." Such pathos is very cheap and may perhaps be made effective with certain classes, but it is also very ludicrous and can lay little claim to common honesty. They who enter such pleadings do small credit to the workings of the model and maxims, and none at all to their own sincerity. For they must know that all such pretense is hollow. It is no disrespect to the Gospel to say that the life of its hero cannot be a model for any man, for it is altogether too scanty and colorless, too devoid of incident and motive, too wholly unlike any life that is now possible among men; besides it was marked by the miraculous at every turn and accordingly is entirely unfit to serve as an example. A striking illustration is afforded in the fact that no man can say with any plausibility what would be the attitude of the Jesus in the present world war, were He dwelling on the earth. Attempts have been repeatedly made to conjecture that attitude, but all such have failed, and a distinguished minister on passing them in review regretfully admits that it is idle to hope we shall ever know what Jesus would have done. The like may be said of nearly the whole casuistry of modern life, which in all its toss and turmoil lies practically wholly beyond the range of both precedent and precept of the Jesus. Nay more, this is not only true in large matters, but also in small. Such glittering generalities as the Golden Rule, noble and holy as it is, avail but very little. There is an implied adverb of supreme *practical* importance. We should do unto others only what we would *justly* have them do to us. But what is justice? On this the Rule sheds no light, and this is the crucial point. Civilization is itself in great measure the quest for justice to all, and how miserably the quest has failed even among the most Christian people is a matter of common knowledge.—Still further evidence, if any were needed, of the inadequacy of the Gospel for modern ethical life is found in the fact that the best works on ethics but rarely cite the Scripture.

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[9] In every case this accent is historically intelligible. The most important, the stress laid upon *chastity*, finds its complete and most interesting explanation in two facts closely related: (1) In the Old Testament and hence in early Christian usage, idolatry, regarded as unfaith toward God, was constantly and regularly symbolized and denounced as adultery or harlotry; indeed, the Babylon of Revelation, the Woman sitting upon many waters, the mother of harlots and of all abominations on earth, who had drenched all nations with her passion's wine of wrath, is obviously nothing else than idolatry or polytheism as embodied in the Roman Empire. (2) The rites of idolatrous worship were so often grossly sexual that idolatry and impurity were regarded as well-nigh one, in thought and in speech they were hardly distinguished, to renounce the one was to renounce the other.—Thus the peculiar stress in question affords convincing proof of the central thesis of radical criticism: that proto-Christianity was a protest against polytheism.

But some one will still protest that the perfect life of Jesus is an indispensable inspiration to all forms of highest endeavor. But this is certainly an illusion. Of this "life" we know scarcely anything at all, of not one single incident are we sure. And even if taken wholly uncritically, at its face-value in the Gospels, it is nevertheless singularly devoid of inspiring situations or precedents. Certainly the early Christian times stood much nearer to this "life" in every particular than we of to-day, and yet it seems to have served them in hardly any measure as inspiration or example. Such use of it in the early Christian literature is vanishingly small. The idea of this "life" as a model is comparatively modern, at least in the stress that is laid upon it. This massive fact is unmistakable in its indication. Descending to particulars, we seek vainly in the alleged human life for incidents to enkindle admiration or supply inspiration. What act of kindness? of generosity? of patience? of self-sacrifice? of warm-heartedness? of friendship even? what deed of daring? of high-heartedness? of self-forgetfulness? of self-denial? The miracles cannot count in this connection. They are all expressions of divine authority, wisdom, and power, nor are they intended to express any human moral quality whatever. Will any sane man pretend to discover an ethical element in stilling a tempest, or multiplying loaves and fishes, or cursing a fig-tree, or cleansing a leper by a touch, or recalling Lazarus to life by a word? A child may perceive that these are all eloquent symbols of religious truths, but even if accepted as biographic facts, what is there in them for us to imitate?[10] Of course, all this constitutes no criticism upon the Jesus or the Gospel; for these documents were not written for biographies, but have been violently perverted into biographic service; they were not intended to depict the career of a model man, but of a conquering religious cult. The value of example and its inspiration can hardly be overestimated, even if we hesitate to admit that "biography is after all the only literature worth reading." But all history positively teems with incidents that splendidly illustrate every virtue of human character and glorify humanity itself with undying illumination, as Athena enkindled Achilles at the trench. The lines of Homer will bear citation (*Il.*, 18, 203-206):

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[10] In *Ecce Deus* (pp. 77-175) and in "Polyxena Christiana" (*The Monist*, April, 1916) this contention is confirmed beyond dispute.

> "Thereat rose up Achilles, belovèd of Zeus, and Athena
> Over his stalwart shoulders her tasseled and terrible ægis
> Flung, and the glorious goddess his head with a diadem golden
> Circled, of cloud, yea, kindled him all with a flaming effulgence."

The present world-war is lit up in terrific radiance with innumerable such records of heroism, devotion, self-abnegation and magnanimity, with which there is in the New Testament nothing to compare, which the generations to come will read with weeping and with rapture, with tears of exultation, of gratitude, and of joy.

Lastly, some one may think that in some mysterious way the human-historic Jesus may illuminate history, may furnish it with interpretation, and outfit it with a philosophy. Such an expectation were indeed not at all unreasonable, but altogether natural, and the fact that it has been totally disappointed is a clear indication of the unreality of its basis. It is notorious that all attempts to construct a distinctively Christian philosophy of history have issued in dismal failure; not one has given satisfaction to any but its author, if indeed even to him. This may be said of the earliest and no less of the very latest, by Prince Troubetzkoy, on "The Meaning of Life, and the World, Revealed on the Cross" (*Hibbert Journal,* April, 1918), which harks back to Tertullian and yields to none in triviality.

In conclusion, some one may still ask, "What then shall we preach? Monotheism is long since a dead issue. What is to take its place? Has it any logical continuation or successor?" The answer is, *Yes, it has.* The natural prolongation, expansion, and development of monotheism is monism. Not any arid philosophical or metaphysical dogma to set over against dualism, not any bare affirmation of oneness of the substance of all that is. So much, indeed; but we do not rest in the footsteps of Parmenides. The doctrine of the higher unity unfolds itself into the doctrine of the brotherhood of man, of liberty, equality, fraternity in the truest and noblest sense that can be given to such words. It blossoms into all the tenderer teachings of universal sympathy, benevolence, beneficence; it matures into the most practical fruits of social justice, of cooperation, of universal education, of mutual protection and helpfulness, of municipalization, nationalization, and internationalization along the paths not merely of luminous theory, but also of carefully chosen and cautiously guarded experiment. Such scientific-philosophic monism is indeed the necessary and indispensable deep-laid basis of rational democracy, of the League of Nations, of the Parliament of Man, the Federation of the World. We might go much further and find in it the only sure foundation of the individual hope and aspiration toward eternity.[11] But that would take us altogether too far afield. Enough that the sublime doctrine of the oneness of God issues and evolves into the still sublimer creed of the oneness of the world, it points toward the shining pathway that conducts the ages from the human individual consciousness toward the universal consciousness divine, the "one far off divine event To which the whole creation moves."

Here then is the natural and all-sufficient succession to the original proto-Christian proclamation of the One God of all men, without distinction of Jew or Greek, wise or unwise, bond or free. It will hardly be denied that it abounds in dignity, in majesty, and in inspiration, that it looks in the direction of the march of the centuries.—The Church itself has dimly felt that some such transformation was impending, was coming upon it from afar, resistless and unavoidable as the tidal wave of the ocean. Hence the extraordinary stress that it lays of late upon "social service" in all its forms, hence such a work as the recent one of Rauschenbusch upon a *Theology for the Social Gospel.* Undoubtedly the Church *might* make itself an agency of untold good, and *might* move humanity forward on this path with incalculable impetus. But alas! the "vested interests" insist on going forth, into the battle of the twentieth century, clad in the armor of the Dark Ages, of fifteen hundred years ago. Entirely misunderstanding the New Testament and the early Christian movement, the Church in all its endless divisions persists in binding upon the heart and mind of all its children an insupportable burden of crude irrationalism, of crass historic literalism, and often even of the blindest superstition, "a yoke that neither our fathers nor we were able to bear." It is this fact that makes the sight of modern Christianity the saddest that the sun has ever shone upon: the fair form of the elder faith completely overgrown with a hideous excrescence of senseless and impossible dogmas. The single nerve, root, and sinew of this prodigious tumor is the tenet of the human-historic Jesus. When this is cut through and through, the whole unsightly mass falls forever away, the mind of man is once again free, it leaps up from the dust and mire unto its own towering height and rejoices as a strong man to run a race. Such is the radical surgery of the new criticism, and such is the healed and enfranchised human spirit that remains.

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[11] See the writer's "Mors Mortis" (*The Monist*, July, 1918).

William Benjamin Smith.

New Orleans, July 29, 1918.

NOTES.

A. The appointment and consecration of Dr. Henson to the See of Hereford, despite a certain uncertainty "of his sincere and positive belief in the doctrines named (i. e., the Miracle of the Virgin Birth of our Lord and the Miracle of His Bodily Resurrection on the third day)," have provoked some more or less excited discussion, even the best of which, as that by Kirsopp Lake, Wm. Sanday, Alfred Fawkes, the Bishop of Oxford, and the 162 protesting "Priests of the Diocese of London," it seems hard to read without a feeling of deep depression. Especially disheartening is the defense of Dr. Henson by his "Honorary Chaplain," which commends the Archbishop's "tact" "in a difficult situation" (*Hibbert Journal,* Oct., 1918, p. 85). Dr. Henson was "indeed astonished that any candid reader" of his published works could doubt that "when you repeat the words of the Creed you do so *ex animo.*" But we do not learn the secret of the Latin phrase. Professor Lake seemed to think it meant *e mente auctoris,* but Fawkes assures us he "entirely mistakes." Perhaps *e mente lectoris* were better; the *reader* may well be *out of his mind* when he "repeats the words of the Creed." Dr. Henson has gained his see; but what shall it profit a man....?

The Bishop of Oxford thinks "The substance of the spiritual body will surely be, we suppose, as much more fine and delicate than our present body as the ether is more fine and delicate than common matter" (*The Creed of the Christian,* p. 105). If "ether is more fine and delicate than common matter," this does not mean that it is superior and fitter for a "spiritual body" (the distinction in 1 Cor. xv. 44 is between the present "body for soul" and the future "body for spirit"), but only that it is more rudimentary, less highly organized, and hence less fitted,—even as hydrogen or helium is "more fine and delicate" and hence less fitted than the "common matter" of neurones. The "ghosts," "photographed twice consecutively" by Schrenck-Notzing and others, were surely "fine and delicate" enough, yet few would prefer them as bodies.

However, there is one signal of hope: Professor Sanday apparently rejects the "literal" sense of the Creed; he doubts "if 'figurative' is the best word that we can use"; he "would submit that 'symbolical' would be a better term" (*Hibbert Journal,* Oct., 1918, p. 81). Seven times, even seventy times seven, men have "looked toward the sea," toward Britain; at last "ariseth a cloud ...—as small as a man's hand." But big with promise. If the Creed must be understood as "symbolical," so also the Gospels, which it professes to formulate,—and the whole radical criticism comes at length into its own.

B (see p. 18). The preaching "to the imprisoned spirits" is fully and sufficiently set forth in the *Book of Enoch* (xii-xvi), where Enoch, the "Scribe of Righteousness," is sent by the "Lord of Sublimity" to preach to the "watchers of heaven" (who were "holy and ever-living spirits," but are now bound "in fetters" "for all generations"), that they "shall never find peace," since, though "sons of heaven," they had sinned with "women," "the daughters of men" (Gen. vi. 2, 4). It seems certain that the reference in 1 Peter iii. 19 is to this interesting mission of Enoch, whose name appears to have fallen out of the text through a very common scribal error. The Greek now reads: ENΩKAI, and the KAI was probably shortened to K', so that the full text would have read: ENΩK'ENΩX, and the second half, mistaken for a repetition of the first, was wittingly or unwittingly omitted in transcribing. Whether or no this acute suggestion by J. Rendel Harris be exactly correct, there can hardly be any doubt that he who "preached to the spirits in prison" was Enoch, and *not* the Jesus; and accordingly Moffatt now has the courage to translate: "It was in the Spirit that Enoch also went and preached" etc. And so, thanks to the erring vision of an unknown scribe, this romantic fancy of an unknown seer, the Verne or Wells of two thousand years ago, has encysted itself firmly in the Creed of Christendom! W. B. S.

THE PHILOSOPHY OF LOGICAL ATOMISM.

III. ATOMIC AND MOLECULAR PROPOSITIONS.

I DID not quite finish last time the syllabus that I intended for Lecture II, so I must first do that.

I had been speaking at the end of my last lecture on the subject of the self-subsistence of particulars, how each particular has its being independently of any other and does not depend upon anything else for the logical possibility of its existence. I compared particulars with the old conception of substance, that is to say, they have the quality of self-subsistence that used to belong to substance, but not the quality of persistence through time. A particular, as a rule, is apt to last for a very short time indeed, not an instant but a very short time. In that respect particulars differ from the old substances but in their logical position they do not. There is, as you know, a logical theory which is quite opposed to that view, a logical theory according to which, if you really understood any one thing, you would understand everything. I think that rests upon a certain confusion of ideas. When you have acquaintance with a particular, you understand that particular itself quite fully, independently of the fact that there are a great many propositions about it that you do not know, but propositions concerning the particular are not necessary to be known in order that you may know what the particular itself is. It is rather the other way round. In order to understand a proposition in which the name of a particular occurs, you must already be acquainted with that particular. The acquaintance with the simpler is presupposed in the understanding of the more complex, but the logic that I should wish to combat maintains that in order thoroughly to know any one thing, you must know all its relations and all its qualities, all the propositions in fact in which that thing is mentioned; and you deduce of course from that that the world is an interdependent whole. It is on a basis of that sort that the logic of monism develops. Generally one supports this theory by talking about the "nature" of a thing, assuming that a thing has something which you call its "nature" which is generally elaborately confounded and distinguished from the thing, so that you can get a comfortable see-saw which enables you to deduce whichever results suit the moment. The "nature" of the thing would come to mean all the true propositions in which the thing is mentioned. Of course it is clear that since everything has relations to everything else, you cannot know all the facts of which a thing is a constituent without having some knowledge of everything in the universe. When you realize that what one calls "knowing a particular" merely means acquaintance with that particular and is presupposed in the understanding of any proposition in which that particular is mentioned, I think you also realize that you cannot take the view that the understanding of the name of the particular presupposes knowledge of all the propositions concerning that particular.

I should like to say about understanding, that that phrase is often used mistakenly. People speak of "understanding the universe" and so on. But, of course, the only thing you can really understand (in the strict sense of the word) is a symbol, and to understand a symbol is to know what it stands for.

I pass on from particulars to predicates and relations and what we mean by understanding the words that we use for predicates and relations. A very great deal of what I am saying in this course of lectures consists of ideas which I derived from my friend Wittgenstein. But I have had no opportunity of knowing how far his ideas have changed since August 1914, nor whether he is alive or dead, so I cannot make any one but myself responsible for them.

Understanding a predicate is quite a different thing from understanding a name. By a predicate, as you know, I mean the word that is used to designate a quality such as red, white, square, round, and the understanding of a word like that involves a different kind of act of mind from that which is involved in understanding a name. To understand a name you must be acquainted with the particular of which it is a name, and you must know that it is the name of that particular. You do not, that is to say, have any suggestion of the form of a proposition, whereas in understanding a predicate you do. To understand "red," for instance, is to understand what is meant by saying that a thing is red. You have to bring in the form of a proposition. You do not have to know, concerning any particular "this," that "This is red" but you have to know what is the meaning of saying that anything is red. You have to understand what one would call "being red." The importance of that is in connection with the theory of types, which I shall come to later on. It is in the fact that a predicate can never occur except as a predicate. When it seems to occur as a subject, the phrase wants amplifying and explaining, unless, of course, you are talking about the word itself. You may say " 'Red' is a predicate," but then you must have "red" in inverted commas because you are talking about the word "red." When you understand "red" it means that you understand propositions of the form that "x is red." So that the understanding of a predicate is something a little more complicated than the understanding of a name, just because of that. Exactly the same applies to relations, and in fact all those things that are not particulars. Take, e. g., "before" in "x is before y": you understand "before" when you understand what that would mean if x and y were given. I do not mean you know whether it is true, but you understand the proposition. Here again the same thing applies. A relation can never occur except as a relation, never as a subject. You will always have to put in hypothetical terms, if not real ones, such as "If I say that x is before y, I assert a relation between x and y." It is in this way that you will have to expand such a statement as "'Before' is a relation" in order to get its meaning.

The different sorts of words, in fact, have different sorts of uses and must be kept always to the right use and not to the wrong use, and it is fallacies arising from putting symbols to wrong uses that lead to the contradictions concerned with types.

There is just one more point before I leave the subjects I meant to have dealt with last time, and that is a point which came up in discussion at the conclusion of the last lecture, namely, that if you like you can get a formal reduction of (say) monadic relations to dyadic, or of dyadic to triadic, or of all the relations below a certain order to all above that order, but the converse deduction is not possible. Suppose one takes, for example, "red." One says, "This is red," "That is red," and so forth. Now, if any one is of opinion that there is reason to try to get on without subject-predicate propositions, all that is necessary is to take some standard red thing and have a relation which one might call "color-likeness," sameness of color, which would be a direct relation, not consisting in having a certain color. You can then define the things which are red, as all the things that have color-likeness to this standard thing. That is practically the treatment that Berkeley and Hume recommended, except that they did not recognize that they were reducing qualities to relations, but thought they were getting rid of "abstract ideas" altogether. You can perfectly well do in that way a formal reduction of predicates to relations. There is no objection to that either empirically or logically. If you think it is worth while you can proceed in exactly the same way with dyadic relations, which you can reduce to triadic. Royce used to have a great affection for that process. For some reason he always liked triadic relations better than dyadic ones; he illustrated his preference in his contributions to mathematical logic and the principles of geometry.

All that is possible. I do not myself see any particular point in doing it as soon as you have realized that it is possible. I see no particular reason to suppose that the simplest relations that occur in the world are (say) of order *n*, but there is no *a priori* reason against it. The converse reduction, on the other hand, is quite impossible except in certain special cases where the relation has some special properties. For example, dyadic relations can be reduced to sameness of predicate when they are symmetrical and transitive. Thus, e. g., the relation of color-likeness will have the property that if A has exact color-likeness with B and B with C, then A has exact color-likeness with C; and if A has it with B, B has it with A. But the case is otherwise with asymmetrical relations.

Take for an example "A is greater than B." It is obvious that "A is greater than B" does not consist in A and B having a common predicate, for if it did it would require that B should also be greater than A. It is also obvious that it does not consist merely in their having different predicates, because if A has a different predicate from B, B has a different predicate from A, so that in either case, whether of sameness or difference of predicate, you get a symmetrical relation. For instance, if A is of a different color from B, B is of a different color from A. Therefore when you get symmetrical relations, you have relations which it is formally impossible to reduce to either sameness of predicate or difference of predicate, but when you come to asymmetrical relations there is no such possibility. This impossibility of reducing dyadic relations to sameness or difference of predicate is a matter of a good deal of importance in connection with traditional philosophy, because a great deal of traditional philosophy depends upon the assumption that every proposition really is of the subject-predicate form, and that is certainly not the case. That theory dominates a great part of traditional metaphysics and the old idea of substance and a good deal of the theory of the Absolute, so that that sort of logical outlook which had its imagination dominated by the theory that you could always express a proposition in a subject-predicate form has had a very great deal of influence upon traditional metaphysics.

That is the end of what I ought to have said last time, and I come on now to the proper topic of to-day's lecture, that is *molecular* propositions. I call them molecular propositions because they contain other propositions which you may call their atoms, and by molecular propositions I mean propositions having such words as "or," "if," "and," and so forth. If I say, "Either to-day is Tuesday, or we have all made a mistake in being here," that is the sort of proposition that I mean that is molecular. Or if I say, "If it rains, I shall bring my umbrella," that again is a molecular proposition because it contains the two parts "It rains" and "I shall bring my umbrella." If I say, "It did rain and I did bring my umbrella," that again is a molecular proposition. Or if I say, "The supposition of its raining is incompatible with the supposition of my not bringing my umbrella," that again is a molecular proposition. There are various propositions of that sort, which you can complicate *ad infinitum.* They are built up out of propositions related by such words as "or," "if," "and," and so on. You remember that I defined an atomic proposition as one which contains a single verb. Now there are two different lines of complication in proceeding from these to more complex propositions. There is the line that I have just been talking about, where you proceed to molecular propositions, and there is another line which I shall come to in a later lecture, where you have not two related propositions, but one proposition containing two or more verbs. Examples are got from believing, wishing, and so forth. "I believe Socrates is mortal." You have there two verbs, "believe" and "is." Or "I wish I were immortal." Anything like that where you have a wish or a belief or a doubt involves two verbs. A lot of psychological attitudes involve two verbs, not, as it were, crystallized out, but two verbs within the one unitary proposition. But I am talking to-day about molecular propositions, and you will understand that you can make propositions with "or" and "and" and so forth, where the constituent propositions are not atomic, but for the moment we can confine ourselves to the case where the constituent propositions are atomic. When you take an atomic proposition, or one of these propositions like "believing," when you take any proposition of that sort, there is just one fact which is pointed to by the proposition, pointed to either truly or falsely. The essence of a proposition is that it can correspond in two ways with a fact, in what one may call the true way or the false way. You might illustrate it in a picture like this:

True: $\overrightarrow{\text{Prop.}}$ Fact.

False: Fact. $\overrightarrow{\text{Prop.}}$

Supposing you have the proposition "Socrates is mortal," either there would be the fact that Socrates is mortal or there would be the fact that Socrates is not mortal. In the one case it corresponds in a way that makes the proposition true, in the other case in a way that makes the proposition false. That is one way in which a proposition differs from a name.

There are, of course, two propositions corresponding to every fact, one true and one false. There are no false facts, so you cannot get one fact for every proposition but only for every pair of propositions. All that applies to atomic propositions. But when you take such a proposition as "*p* or *q*," "Socrates is mortal or Socrates is living still,"there you will have two different facts involved in the truth or the falsehood of your proposition "*p* or *q*." There will be the fact that corresponds to *p* and there will be the fact that corresponds to *q*, and both of those facts are relevant in discovering the truth or falsehood of "*p* or *q*." I do not suppose there is in the world a single disjunctive fact corresponding to "*p* or *q*." It does not look plausible that in the actual objective world there are facts going about which you could describe as "*p* or *q*," but I would not lay too much stress on what strikes one as plausible: it is not a thing you can rely on altogether. For the present I do not think any difficulties will arise from the supposition that the truth or falsehood of this proposition "*p* or *q*" does not depend upon a single objective fact which is disjunctive but depends on the two facts one of which corresponds to *p* and the other to *q*: *p* will have a fact corresponding to it and *q* will have a fact corresponding to it. That is to say, the truth or falsehood of this proposition "*p* or *q*" depends upon two facts and not upon one, as *p* does and as *q* does. Generally speaking, as regards these things that you make up out of two propositions, the whole of what is necessary in order to know their meaning is to know under what circumstances they are true, given the truth or falsehood of p and the truth or falsehood of q. That is perfectly obvious. You have as a schema,

for "p or q," using "TT" for "p and q both true"
"TF" for "p true and q false," etc.,

TT	TF	FT	FF
T	T	T	F

where the bottom line states the truth or the falsehood of "p or q." You must not look about the real world for an object which you can call "or," and say, "Now, look at this. This is 'or.' " There is no such thing, and if you try to analyze "p or q" in that way you will get into trouble. But the meaning of disjunction will be entirely explained by the above schema.

I call these things truth-functions of propositions, when the truth or falsehood of the molecular proposition depends only on the truth or falsehood of the propositions that enter into it. The same applies to "p and q" and "if p then q" and "p is incompatible with q." When I say "p is incompatible with q" I simply mean to say that they are not both true. I do not mean any more. Those sort of things are called truth-functions, and these molecular propositions that we are dealing with to-day are instances of truth-functions. If p is a proposition, the statement that "I believe p" does not depend for its truth or falsehood, simply upon the truth or falsehood of p, since I believe some but not all true propositions and some but not all false propositions.

I just want to give you a little talk about the way these truth-functions are built up. You can build up all these different sorts of truth-functions out of one source, namely "p is incompatible with q," meaning by that that they are not both true, that one at least of them is false.

We will denote "p is incompatible with q" by p/q.

Take for instance p/p, i. e., "p is incompatible with itself." In that case clearly p will be false, so that you can take "p/p" as meaning "p is false," i. e., $p/p =$ not p. The meaning of molecular propositions is entirely determined by their truth-schema and there is nothing more in it than that, so that when you have got two things of the same truth-schema you can identify them.

Suppose you want "if p then q," that simply means that you cannot have p without having q, so that p is incompatible with the falsehood of q. Thus,

$$\text{"If } p \text{ then } q\text{"} = p/(q/q).$$

When you have that, it follows of course at once that if p is true, q is true, because you cannot have p true and q false.

Suppose you want "p or q," that means that the falsehood of p is incompatible with the falsehood of q. If p is false, q is not false, and *vice versa.* That will be

$$(p/p)/(q/q).$$

Suppose you want "p and q are both true." That will mean that p is not incompatible with q. When p and q are both true, it is not the case that at least one of them is false. Thus,

$$\text{"}p \text{ and } q \text{ are both true"} = (p/q)/(p/q).$$

The whole of the logic of deduction is concerned simply with complications and developments of this idea. This idea of incompatibility was first shown to be sufficient for the purpose by Mr. Sheffer, and there was a good deal of work done subsequently by M. Nicod. It is a good deal simpler when it is done this way than when it is done in the way of *Principia Mathematica,* where there are two primitive ideas to start with, namely "or" and "not." Here you can get on with only a single premise for deduction.

I will not develop this subject further because it takes you right into mathematical logic.

I do not see any reason to suppose that there is a complexity in the facts corresponding to these molecular propositions, because, as I was saying, the correspondence of a molecular proposition with facts is of a different sort from the correspondence of an atomic proposition with a fact. There is one special point that has to be gone into in connection with this, that is the question: Are there negative facts? Are there such facts as you might call the fact that "Socrates is not alive"? I have assumed in all that I have said hitherto that there are negative facts, that for example if you say "Socrates is alive," there is corresponding to that proposition in the real world the fact that Socrates is not alive. One has a certain repugnance to negative facts, the same sort of feeling that makes you wish not to have a fact "*p* or *q*" going about the world. You have a feeling that there are only positive facts, and that negative propositions have somehow or other got to be expressions of positive facts. When I was lecturing on this subject at Harvard I argued that there were negative facts, and it nearly produced a riot: the class would not hear of there being negative facts at all. I am still inclined to think that there are. However, one of the men to whom I was lecturing at Harvard, Mr. Demos, subsequently wrote an article in *Mind* to explain why there are no negative facts. It is in *Mind* for April 1917. I think he makes as good a case as can be made for the view that there are no negative facts. It is a difficult question. I really only ask that you should not dogmatize. I do not say positively that there are, but there may be.

There are certain things you can notice about negative propositions. Mr. Demos points out, first of all, that a negative proposition is not in any way dependent on a cognitive subject for its definition. To this I agree. Suppose you say, when I say "Socrates is not alive," I am merely expressing disbelief in the proposition that Socrates is alive. You have got to find something or other in the real world to make this disbelief true, and the only question is what. That is his first point.

His second is that a negative proposition must not be taken at its face value. You cannot, he says, regard the statement "Socrates is not alive" as being an expression of a fact in the same sort of direct way in which "Socrates is human" would be an expression of a fact. His argument for that is solely that he cannot believe that there are negative facts in the world. He maintains that there cannot be in the real world such facts as "Socrates is not alive," taken, i. e., as simple facts, and that therefore you have got to find some explanation of negative propositions, some interpretation, and that they cannot be just as simple as positive propositions. I shall come back to that point, but on this I do not feel inclined to agree.

His third point I do not entirely agree with: that when the word "not" occurs, it cannot be taken as a qualification of the predicate. For instance, if you say that "This is not red," you might attempt to say that "not-red" is a predicate, but that of course won't do; in the first place because a great many propositions are not expressions of predicates; in the second place because the word "not" applies to the whole proposition. The proper expression would be "not: this is red"; the "not" applies to the whole proposition "this is read," and of course in many cases you can see that quite clearly. If you take a case I took in discussing descriptions: "The present king of France is not bald." If you take "not-bald" as a predicate, that would have to be judged false on the ground that there is not a present king of France. But it is clear that the proposition "The present king of France is bald" is a false proposition, and therefore the negative of that will have to be a true proposition, and that could not be the case if you take "not-bald" as a predicate, so that in all cases where a "not" comes in, the "not" has to be taken to apply to the whole proposition. "Not-*p*" is the proper formula.

We have come now to the question, how are we really to interpret "not-*p*," and the suggestion offered by Mr. Demos is that when we assert "not-*p*" we are really asserting that there is some proposition *q* which is true and is incompatible with *p* ("an opposite of *p*" is his phrase, but I think the meaning is the same). That is his suggested definition:

> "not-*p*" means "There is a proposition *q* which is true and is incompatible with *p*."

As, e. g., if I say "This chalk is not red," I shall be meaning to assert that there is some proposition, which in this case would be the proposition "This chalk is white," which is inconsistent with the proposition "It is red," and that you use these general negative forms because you do not happen to know what the actual proposition is that is true and is incompatible with *p*. Or, of course, you may possibly know what the actual proposition is, but you may be more interested in the fact that *p* is false than you are in the particular example which makes it false. As, for instance, you might be anxious to prove that some one is a liar, and you might be very much interested in the falsehood of some proposition which he had asserted. You might also be more interested in the general proposition than in the particular case, so that if some one had asserted that that chalk was red, you might be more interested in the fact that it was not red than in the fact that it was white.

I find it very difficult to believe that theory of falsehood. You will observe that in the first place there is this objection, that it makes incompatibility fundamental and an objective fact, which is not so very much simpler than allowing negative facts. You have got to have here "That *p* is incompatible with *q*" in order to reduce "not" to incompatibility, because this has got to be the corresponding fact. It is perfectly clear, whatever may be the interpretation of "not," that there is *some* interpretation which will give you a fact. If I say "There is not a hippopotamus in this room," it is quite clear there is some way of interpreting that statement according to which there is a corresponding fact, and the fact cannot be merely that every part of this room is filled up with something that is not a hippopotamus. You would come back to the necessity for some kind or other of fact of the sort that we have been trying to avoid. We have been trying to avoid both negative facts and molecular facts, and all that this succeeds in doing is to substitute molecular facts for negative facts, and I do not consider that that is very successful as a means of avoiding paradox, especially when you consider this, that even if incompatibility is to be taken as a sort of fundamental expression of fact, incompatibility is not between facts but between propositions. If I say "*p* is incompatible with *q*," one at least of *p* and *q* has got to be false. It is clear that no two *facts* are incompatible. The incompatibility holds between the propositions, between the *p* and the *q*, and therefore if you are going to take incompatibility as a fundamental fact, you have got, in explaining negatives, to take as your fundamental fact something involving propositions as opposed to facts. It is quite clear that propositions are not what you might call "real." If you were making an inventory of the world, propositions would not come in. Facts would, beliefs, wishes, wills would, but propositions would not. They do not have being independently, so that this incompatibility of propositions taken as an ultimate fact of the real world will want a great deal of treatment, a lot of dressing up before it will do. Therefore as a simplification to avoid negative facts, I do not think it really is very successful. I think you will find that it is simpler to take negative facts as facts, to assume that "Socrates is not alive" is really an objective fact in the same sense in which "Socrates is human" is a fact. This theory of Mr. Demos's that I have been setting forth here is a development of the one one hits upon at once when one tries to get round negative facts, but for the reasons that I have given, I do not think it really answers to take things that way, and I think you will find that it is better to take negative facts as ultimate. Otherwise you will find it so difficult to say what it is that corresponds to a proposition. When, e. g., you have a false positive proposition, say "Socrates is alive," it is false because of a fact in the real world. A thing cannot be false except because of a fact, so that you find it extremely difficult to say what exactly happens when you make a positive assertion that is false, unless you are going to admit negative facts. I think all those questions are difficult and there are arguments always to be adduced both ways, but on the whole I do incline to believe that there are negative facts and that there are not disjunctive facts. But the denial of disjunctive facts leads to certain difficulties which we shall have to consider in connection with general propositions in a later lecture.

DISCUSSION.

.... Do you consider that the proposition "Socrates is dead" is a positive or a negative fact?

Mr. Russell: It is partly a negative fact. To say that a person is dead is complicated. It is two statements rolled into one: "Socrates was alive" and "Socrates is not alive."

.... Does putting the "not" into it give it a formal character of negative and vice versa?

Mr. Russell: No, I think you must go into the meaning of words.

.... I should have thought there was a great difference between saying that "Socrates is alive" and saying that "Socrates is not a living man." I think it is possible to have what one might call a negative existence and that things exist of which we cannot take cognizance. Socrates undoubtedly did live but he is no longer in the condition of living as a man.

Mr. Russell: I was not going into the question of existence after death but simply taking words in their every-day signification.

.... What is precisely your test as to whether you have got a positive or negative proposition before you?

Mr. Russell: There is no formal test.

.... If you had a formal test, would it not follow that you would know whether there were negative facts or not?

Mr. Russell: No, I think not. In the perfect logical language that I sketched in theory, it would always be obvious at once whether a proposition was positive or negative. But it would not bear upon how you are going to interpret negative propositions.

.... Would the existence of negative facts ever be anything more than a mere definition?

Mr. Russell: Yes, I think it would. It seems to me that the business of metaphysics is to describe the world, and it is in my opinion a real definite question whether in a complete description of the world you would have to mention negative facts or not.

.... How do you define a negative fact?

Mr. Russell: You could not give a general definition if it is right that negativeness is an ultimate.

IV. PROPOSITIONS AND FACTS WITH MORE THAN ONE VERB; BELIEFS, ETC.

You will remember that after speaking about atomic propositions I pointed out two more complicated forms of propositions which arise immediately on proceeding further than that: the first, which I call molecular propositions, which I dealt with last time, involving such words as "or," "and," "if," and the second involving two or more verbs such as believing, wishing, willing, and so forth.

In the case of molecular propositions it was not clear that we had to deal with any new form of fact, but only with a new form of proposition, i. e., if you have a disjunctive proposition such as "p or q" it does not seem very plausible to say that there is in the world a disjunctive fact corresponding to "p or q" but merely that there is a fact corresponding to p and a fact corresponding to q, and the disjunctive proposition derives its truth or falsehood from those two separate facts. Therefore in that case one was dealing only with a new form of proposition and not with a new form of fact. To-day we have to deal with a new form of fact.

I think one might describe philosophical logic, the philosophical portion of logic which is the portion that I am concerned with in these lectures since Christmas [1917], as an inventory, or if you like a more humble word, a "Zoo" containing all the different forms that facts may have. I should prefer to say "forms of facts" rather than "forms of propositions." To apply that to the case of molecular propositions which I dealt with last time, if one were pursuing this analysis of the forms of facts, it would be *belief in* a molecular proposition that one would deal with rather than the molecular proposition itself. In accordance with the sort of realistic bias that I should put into all study of metaphysics, I should always wish to be engaged in the investigation of some actual fact or set of facts, and it seems to me that that is so in logic just as much as it is in zoology. In logic you are concerned with the forms of facts, with getting hold of the different sorts of facts, different *logical* sorts of facts, that there are in the world. Now I want to point out to-day that the facts that occur when one believes or wishes or wills have a different logical form from the atomic facts containing a single verb which I dealt with in my second lecture. (There are, of course, a good many forms that facts may have, a strictly infinite number, and I do not wish you to suppose that I pretend to deal with all of them.) Suppose you take any actual occurrence of a belief. I want you to understand that I am not talking about beliefs in the sort of way in which judgment is spoken of in theory of knowledge, in which you would say there is *the* judgment that two and two are four. I am talking of the actual occurrence of a belief in a particular person's mind at a particular moment, and discussing what sort of a fact that is. If I say "What day of the week is this?" and you say "Tuesday," there occurs in your mind at that moment the belief that this is Tuesday. The thing I want to deal with to-day is the question, What is the form of the fact which occurs when a person has a belief. Of course you see that the sort of obvious first notion that one would naturally arrive at would be that a belief is a relation to the proposition. "I believe the proposition p." "I believe that to-day is Tuesday." "I believe that two and two are four." Something like that. It seems on the face of it as if you had there a relation of the believing subject to a proposition. That view won't do for various reasons which I shall go into. But you have therefore got to have a theory of belief which is not exactly that. Take any sort of proposition, say "I believe Socrates is mortal." Suppose that that belief does actually occur. The statement that it occurs is a statement of fact. You have there two verbs. You may have more than two verbs, you may have any number greater than one. I may believe that Jones is of opinion that Socrates is mortal. There you have more than two verbs. You may have any number, but you cannot have less than two. You will perceive that it is not only the proposition that has the two verbs, but also the fact, which is expressed by the proposition, has two constituents corresponding to verbs. I shall call those constituents verbs for the sake of shortness, as it is very difficult to find any word to describe all those objects which one denotes by verbs. Of course, that is strictly using the word "verb" in two different senses, but I do not think it can lead to any confusion if you understand that it is being so used. This fact (the belief) is one fact. It is not like what you had in molecular propositions where you had (say) "p or q." It is just one single fact that you have a belief. That is obvious from the fact that you can believe a falsehood. It is obvious from the fact of false belief that you cannot cut off one part: you cannot have

I believe/Socrates is mortal.

There are certain questions that arise about such facts, and the first that arises is, Are they undeniable facts or can you reduce them in some way to relations of other facts? Is it really necessary to suppose that there are irreducible facts, of which that sort of thing is a verbal expression? On that question until fairly lately I should certainly not have supposed that any doubt could arise. It had not really seemed to me until fairly lately that that was a debatable point. I still believe that there are facts of that form, but I see that it is a substantial question that needs to be discussed.

1. *Are beliefs, etc., irreducible facts?*

"Etc." covers understanding a proposition; it covers desiring, willing, any other attitude of that sort that you may think of that involves a proposition. It seems natural to say one believes a proposition and unnatural to say one desires a proposition, but as a matter of fact that is only a prejudice. What you believe and what you desire are of exactly the same nature. You may desire to get some sugar to-morrow and of course you may possibly believe that you will. I am not sure that the logical form is the same in the case of will. I am inclined to think that the case of will is more analogous to that of perception, in going direct to facts, and excluding the possibility of falsehood. In any case desire and belief are of exactly the same form logically.

Pragmatists and some of the American realists, the school whom one calls neutral monists, deny altogether that there is such a phenomenon as belief in the sense I am dealing with. They do not deny it in words, they do not use the same sort of language that I am using, and that makes it difficult to compare their views with the views I am speaking about. One has really to translate what they say into language more or less analogous to ours before one can make out where the points of contact or difference are. If you take the works of James in his *Essays in Radical Empiricism* or Dewey in his *Essays in Experimental Logic* you will find that they are denying altogether that there is such a phenomenon as belief in the sense I am talking of. They use the word "believe" but they mean something different. You come to the view called "behaviorism," according to which you mean, if you say a person believes a thing, that he behaves in a certain fashion; and that hangs together with James's pragmatism. James and Dewey would say: when I believe a proposition, that *means* that I act in a certain fashion, that my behavior has certain characteristics, and my belief is a true one if the behavior leads to the desired result and is a false one if it does not. That, if it is true, makes their pragmatism a perfectly rational account of truth and falsehood, if you do accept their view that belief as an isolated phenomenon does not occur. That is therefore the first thing one has to consider. It would take me too far from logic to consider that subject as it deserves to be considered, because it is a subject belonging to psychology, and it is only relevant to logic in this one way that it raises a doubt whether there are any facts having the logical form that I am speaking of. In the question of this logical form that involves two or more verbs you have a curious interlacing of logic with empirical studies, and of course that may occur elsewhere, in this way, that an empirical study gives you an example of a thing having a certain logical form, and you cannot really be sure that there are things having a given logical form except by finding an example, and the finding of an example is itself empirical. Therefore in that way empirical facts are relevant to logic at certain points. I think theoretically one might know that there were those forms without knowing any instance of them, but practically, situated as we are, that does not seem to occur. Practically, unless you can find an example of the form you won't know that there is that form. If I cannot find an example containing two or more verbs, you will not have reason to believe in the theory that such a form occurs.

When you read the works of people like James and Dewey on the subject of belief, one thing that strikes you at once is that the sort of thing they are thinking of as the object of belief is quite different from the sort of thing I am thinking of. They think of it always as a thing. They think you believe in God or Homer: you believe in an object. That is the picture they have in their minds. It is common enough, in common parlance, to talk that way, and they would say, the first crude approximation that they would suggest would be that you believe truly when there is such an object and that you believe falsely when there is not. I do not mean they would say that exactly, but that would be the crude view from which they would start. They do not seem to have grasped the fact that the objective side in belief is better expressed by a proposition than by a single word, and that, I think, has a great deal to do with their whole outlook on the matter of what belief consists of. The object of belief in their view is generally, not relations between things, or things having qualities, or what not, but just single things which may or may not exist. That view seems to me radically and absolutely mistaken. In the first place there are a great many judgments you cannot possibly fit into that scheme, and in the second place it cannot possibly give any explanation to false beliefs, because when you believe that a thing exists and it does not exist, the thing is not there, it is nothing, and it cannot be the right analysis of a false belief to regard it as a relation to what is really nothing. This is an objection to supposing that belief consists simply in relation to the object. It is obvious that if you say "I believe in Homer" and there was no such person as Homer, your belief cannot be a relation to Homer, since there is no "Homer." Every fact that occurs in the world must be composed entirely of constituents that there are, and not of constituents that there are not. Therefore when you say "I believe in Homer" it cannot be the right analysis of the thing to put it like that. What the right analysis is I shall come on to in the theory of descriptions. I come back now to the theory of behaviorism which I spoke of a moment ago. Suppose, e. g., that you are said to believe that there is a train at 10.25. This means, we are told, that you start for the station at a certain time. When you reach the station you see it is 10.24 and you run. That behavior constitutes your belief that there is a train at that time. If you catch your train by running, your belief was true. If the train went at 10.23, you miss it, and your belief was false. That is the sort of thing that they would say constitutes belief. There is not a single state of mind which consists in contemplating this eternal verity, that the train starts at 10.25. They would apply that even to the most abstract things. I do not myself feel that that view of things is tenable.

It is a difficult one to refute because it goes very deep and one has the feeling that perhaps, if one thought it out long enough and became sufficiently aware of all its implications, one might find after all that it was a feasible view; but yet I do not *feel* it feasible. It hangs together, of course, with the theory of neutral monism, with the theory that the material constituting the mental is the same as the material constituting the physical, just like the Post Office directory which gives you people arranged geographically and alphabetically. This whole theory hangs together with that. I do not mean necessarily that all the people that profess the one profess the other, but that the two do essentially belong together. If you are going to take that view, you have to explain away belief and desire, because things of that sort do seem to be mental phenomena. They do seem rather far removed from the sort of thing that happens in the physical world. Therefore people will set to work to explain away such things as belief, and reduce them to bodily behavior; and your belief in a certain proposition will consist in the behavior of your body. In the crudest terms that is what that view amounts to. It does enable you to get on very well without mind. Truth and falsehood in that case consist in the relation of your bodily behavior to a certain fact, the sort of distant fact which is the purpose of your behavior, as it were, and when your behavior is satisfactory in regard to that fact your belief is true, and when your behavior is unsatisfactory in regard to that fact your belief is false. The logical essence, in that view, will be a relation between two facts having the same sort of form as a causal relation, i. e., on the one hand there will be your bodily behavior which is one fact, and on the other hand the fact that the train starts at such and such a time, which is another fact, and out of a relation of those two the whole phenomenon is constituted. The thing you will get will be logically of the same form as you have in cause, where you have "This fact causes that fact." It is quite a different logical form from the facts containing two verbs that I am talking of to-day.

I have naturally a bias in favor of the theory of neutral monism because it exemplifies Occam's razor. I always wish to get on in philosophy with the smallest possible apparatus, partly because it diminishes the risk of error, because it is not necessary to deny the entities you do not assert, and therefore you run less risk of error the fewer entities you assume. The other reason—perhaps a somewhat frivolous one—is that every diminution in the number of entities increases the amount of work for mathematical logic to do in building up things that look like the entities you used to assume. Therefore the whole theory of neutral monism is pleasing to me, but I do find so far very great difficulty in believing it. You will find a discussion of the whole question in some articles I wrote in *The Monist,* especially in July 1914, and in the two previous numbers also. I should really want to rewrite them rather because I think some of the arguments I used against neutral monism are not valid. I place most reliance on the argument about "emphatic particulars," "this," "I," all that class of words, that pick out certain particulars from the universe by their relation to oneself, and I think by the fact that they, or particulars related to them, are present to you at the moment of speaking. "This," of course, is what I call an "emphatic particular." It is simply a proper name for the present object of attention, a proper name, meaning nothing. It is ambiguous, because, of course, the object of attention is always changing from moment to moment and from person to person. I think it is extremely difficult, if you get rid of consciousness altogether, to explain what you mean by such a word as "this," what it is that makes the absence of impartiality. You would say that in a purely physical world there would be a complete impartiality. All parts of time and all regions of space would seem equally emphatic. But what really happens is that we pick out certain facts, past and future and all that sort of thing; they all radiate out from "this," and I have not myself seen how one can deal with the notion of "this" on the basis of neutral monism. I do not lay that down dogmatically, only I do not see how it can be done. I shall assume for the rest of this lecture that there are such facts as beliefs and wishes and so forth. It would take me really the whole of my course to go into the question fully. Thus we come back to more purely logical questions from this excursion into psychology, for which I apologize.

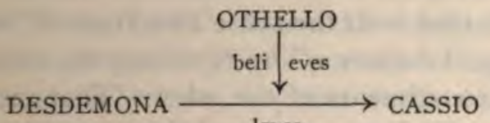
2. *What is the status of p in "I believe p"?*

You cannot say that you believe *facts,* because your beliefs are sometimes wrong. You can say that you *perceive* facts, because perceiving is not liable to error. Wherever it is facts alone that are involved, error is impossible. Therefore you cannot say you believe facts. You have to say that you believe propositions. The awkwardness of that is that obviously propositions are nothing. Therefore that cannot be the true account of the matter. When I say "Obviously propositions are nothing" it is not perhaps quite obvious. Time was when I thought there were propositions, but it does not seem to me very plausible to say that in addition to facts there are also these curious shadowy things going about such as "That to-day is Wednesday" when in fact it is Tuesday. I cannot believe they go about the real world. It is more than one can manage to believe, and I do think no person with a vivid sense of reality can imagine it. One of the difficulties of the study of logic is that it is an exceedingly abstract study dealing with the most abstract things imaginable, and yet you cannot pursue it properly unless you have a vivid instinct as to what is real. You must have that instinct rather well developed in logic.

I think otherwise you will get into fantastic things. I think Meinong is rather deficient in just that instinct for reality. Meinong maintains that there is such an object as the round square only it does not exist, and it does not even subsist, but nevertheless there is such an object, and when you say "The round square is a fiction," he takes it that there is an object "the round square" and there is a predicate "fiction." No one with a sense of reality would so analyze that proposition. He would see that the proposition wants analyzing in such a way that you won't have to regard the round square as a constituent of that proposition. To suppose that in the actual world of nature there is a whole set of false propositions going about is to my mind monstrous. I cannot bring myself to suppose it. I cannot believe that they are there in the sense in which facts are there. There seems to me something about the fact that "To-day is Tuesday" on a different level of reality from the supposition "That to-day is Wednesday." When I speak of the proposition "That to-day is Wednesday" I do not mean the occurrence in future of a state of mind in which you think it is Wednesday, but I am talking about the theory that there is something quite logical, something not involving mind in any way; and such a thing as that I do not think you can take a false proposition to be. I think a false proposition must, wherever it occurs, be subject to analysis, be taken to pieces, pulled to bits, and shown to be simply separate pieces of one fact in which the false proposition has been analyzed away. I say that simply on the ground of what I should call an instinct of reality. I ought to say a word or two about "reality." It is a vague word, and most of its uses are improper. When I talk about reality as I am now doing, I can explain best what I mean by saying that I mean everything you would have to mention in a complete description of the world; that will convey to you what I mean. Now I do not think that false propositions would have to be mentioned in a complete description of the world. False beliefs would, of course, false suppositions would, and desires for what does not come to pass, but not false propositions all alone, and therefore when you, as one says, believe a false proposition, that cannot be an accurate account of what occurs. It is not accurate to say "I believe the proposition *p*" and regard the occurrence as a twofold relation between me and *p*. The logical form is just the same whether you believe a false or a true proposition. Therefore in all cases you are not to regard belief as a two-term relation between yourself and a proposition, and you have to analyze up the proposition and treat your belief differently. Therefore the belief does not really contain a proposition as a constituent but only contains the constituents of the proposition as constituents. You cannot say when you believe, "What is it that you believe?" There is no answer to that question, i. e., there is not a single thing that you are believing. "I believe that to-day is Tuesday." You must not suppose that "That to-day is Tuesday" is a single object which I am believing. That would be an error. That is not the right way to analyze the occurrence, although that analysis is linguistically convenient, and one may keep it provided one knows that it is not the truth.

3. *How shall we describe the logical form of a belief?*

I want to try to get an account of the way that a belief is made up. That is not an easy question at all. You cannot make what I should call a map-in-space of a belief. You can make a map of an atomic fact but not of a belief, for the simple reason that space-relations always are of the atomic sort or complications of the atomic sort. I will try to illustrate what I mean. The point is in connection with there being two verbs in the judgment and with the fact that both verbs have got to occur as verbs, because if a thing is a verb it cannot occur otherwise than as a verb. Suppose I take "A believes that B loves C." "Othello believes that Desdemona loves Cassio." There you have a false belief. You have this odd state of affairs that the verb "loves" occurs in that proposition and seems to occur as relating Desdemona to Cassio whereas in fact it does not do so, but yet it does occur as a verb, it does occur in the sort of way that a verb should do. I mean that when A believes that B loves C, you have to have a verb in the place where "loves" occurs. You cannot put a substantive in its place. Therefore it is clear that the subordinate verb (i. e., the verb other than believing) is functioning as a verb, and seems to be relating two terms, but as a matter of fact does not when a judgment happens to be false. That is what constitutes the puzzle about the nature of belief. You will notice that wherever one gets to really close quarters with the theory of error one has the puzzle of how to deal with error without assuming the existence of the non-existent. I mean that every theory of error sooner or later wrecks itself by assuming the existence of the non-existent. As when I say "Desdemona loves Cassio," it seems as if you have a non-existent love between Desdemona and Cassio, but that is just as wrong as a non-existent unicorn. So you have to explain the whole theory of judgment in some other way. I come now to this question of a map. Suppose you try such a map as this:



This question of making a map is not so strange as you might suppose because it is part of the whole theory of symbolism. It is important to realize where and how a symbolism of that sort would be wrong: where and how it is wrong is that in the symbol you have this relationship relating these two things and in the fact it doesn't really relate them. You cannot get in space any occurrence which is logically of the same form as belief. When I say "logically of the same form" I mean that one can be obtained from the other by replacing the constituents of the one by the new terms. If I say "Desdemona loves Cassio" that is of the same form as "A is to the right of B." Those are of the same form, and I say that nothing that occurs in space is of the same form as belief. I have got on here to a new sort of thing, a new beast for our Zoo, not another member of our former species but a new species. The discovery of this fact is due to Mr. Wittgenstein.

There is a great deal that is odd about belief from a logical point of view. One of the things that are odd is that you can believe propositions of all sorts of forms. I can believe that "This is white" and that "Two and two are four." They are quite different forms, yet one can believe both. The actual occurrence can hardly be of exactly the same logical form in those two cases because of the great difference in the forms of the propositions believed. Therefore it would seem that belief cannot strictly be logically one in all different cases but must be distinguished according to the nature of the proposition that you believe. If you have "I believe p" and "I believe q" those two facts, if p and q are not of the same logical form, are not of the same logical form in the sense I was speaking of a moment ago, that is in the sense that from "I believe p" you can derive "I believe q" by replacing the constituents of one by the constituents of the other. That means that belief itself cannot be treated as being a proper sort of single term. Belief will really have to have different logical forms according to the nature of what is believed. So that the apparent sameness of believing in different cases is more or less illusory.

There are really two main things that one wants to notice in this matter that I am treating of just now. The first is the impossibility of treating the proposition believed as an independent entity, entering as a unit into the occurrence of the belief, and the other is the impossibility of putting the subordinate verb on a level with its terms as an object term in the belief. That is a point in which I think that the theory of judgment which I set forth once in print some years ago was a little unduly simple, because I did then treat the object verb as if one could put it as just an object like the terms, as if one could put "loves" on a level with Desdemona and Cassio as a term for the relation "believe." That is why I have been laying such an emphasis in this lecture to-day on the fact that there are two verbs at least. I hope you will forgive the fact that so much of what I say to-day is tentative and consists of pointing out difficulties. The subject is not very easy and it has not been much dealt with or discussed. Practically nobody has until quite lately begun to consider the problem of the nature of belief with anything like a proper logical apparatus and therefore one has very little to help one in any discussion and so one has to be content on many points at present with pointing out difficulties rather than laying down quite clear solutions.

4 *The question of nomenclature.*

What sort of name shall we give to verbs like "believe" and "wish" and so forth? I should be inclined to call them "propositional verbs." This is merely a suggested name for convenience, because they are verbs which have the *form* of relating an object to a proposition. As I have been explaining, that is not what they really do, but it is convenient to call them propositional verbs. Of course you might call them "attitudes," but I should not like that because it is a psychological term, and although all the instances in our experience are psychological, there is no reason to suppose that all the verbs I am talking of are psychological. There is never any reason to suppose that sort of thing. One should always remember Spinoza's infinite attributes of Deity. It is quite likely that there are in the world the analogues of his infinite attributes. We have no acquaintance with them, but there is no reason to suppose that the mental and the physical exhaust the whole universe, so one can never say that all the instances of any logical sort of thing are of such and such a nature which is not a logical nature: you do not know enough about the world for that. Therefore I should not suggest that all the verbs that have the form exemplified by believing and willing are psychological. I can only say all I know are.

I notice that in my syllabus I said I was going to deal with truth and falsehood to-day, but there is not much to say about them specifically as they are coming in all the time. The thing one first thinks of as true or false is a proposition, and a proposition is nothing. But a belief is true or false in the same way as a proposition is, so that you do have facts in the world that are true or false. I said a while back that there was no distinction of true and false among facts, but as regards that special class of facts that we call "beliefs," there is, in that sense that a belief which occurs may be true or false, though it is equally a fact in either case. One *might* call wishes false in the same sense when one wishes something that does not happen. The truth or falsehood depends upon the proposition that enters in. I am inclined to think that perception, as opposed to belief, does go straight to the fact and not through the proposition. When you perceive the fact you do not, of course, have error coming in, because the moment it is a fact that is your object error is excluded. I think that verification in the last resort would always reduce itself to the perception of facts. Therefore the logical form of perception will be different from the logical form of believing, just because of that circumstance that it is a *fact* that comes in. That raises also a number of logical difficulties which I do not propose to go into, but I think you can see for yourself that perceiving would also involve two verbs just as believing does. I am inclined to think that volition differs from desire logically, in a way strictly analogous to that in which perception differs from belief. But it would take us too far from logic to discuss this view.

[TO BE CONTINUED.]

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THE GREATEST PROBLEM IN VALUE.

THE greatest problem in value I take to be the truth-value. Truth is not itself value. Eternally valid truths must be held to exist without reference to the judging individual. Such universal truths or principles are known in rational intuition; they are the norms or standards of all thinking; and they are, as truths of reason, to be distinguished from facts or the knowledge of particular realities. These *Wahrheiten* must be held to exist eternally, irrespective of their apprehension or not by the human species. They do not exist simply as having a place in the stream of practical development, but are universal, necessary, objective. The truth about a fact does not come after the fact, nor the truth about a reality come after the reality: without truth, neither fact nor reality would be. Truth, however, as truth, is to be distinguished from fact and from reality. Truth is that which is true in itself, and is not mere appearance, as Kant wrongly supposed. When an American philosophical writer says he "cannot conceive by what right a human philosophy has ever announced that the Eternal Order" is "true," I answer, by the best of rights, that of rational intuition. Truth is the most universal presupposition of all thought. But there are ways in which we have come to speak of the truth-value. If we say, "this rose is red," we express only a truth-value or a truth-judgment. Truth-value, if we do use the word value here, is absolute. Truth is the only value that cannot be denied without contradiction; it is the only value that is really absolute. Goodness, for example, carries universal validity for every subject; but it is not valid for every object; in a sense, therefore, it is not absolute. But there is no object to which the truth test cannot be applied. The validity of truth is absolute, and without condition of any sort. Truth is independent of our knowing, but yet dominates our thought. Truth is thus the central determining value of our conscious reflective life. Truth in objective significance is not what James absurdly called an "inert static relation": that cannot be rightly termed "inert" which is in itself the most potent principle and factor in the world, effecting by its very being or presence the cleavage between the worlds of the true and the false. Even the good presupposes the true, truth being the supreme rational good. Of course, all this is without prejudice to the accepted fact that theoretic or truth-values, as apprehended by us, are never untinged by emotional color.

But there is the large class of judgments that go beyond the truth-value; judgments, I mean, concerning what is good, which express not only the objective value-principle of truth, but the subordinate value-principle of morality. Now, the problem of value, as it has appeared in recent German philosophies of the more extreme value-character, has been seen capable of presentation—if it is to rest upon any theory of knowledge—only on the presupposition that truth itself could be treated as value, in the same way and sense as the other values—goodness and beauty. Hence the post-Kantian "philosophy of spirit" has been replaced in the Windelband-Rickertian representations, by a "philosophy of value," of fundamentally Romantic character and tendency. But it has not been consistently or successfully done. Windelband has attempted it in ways or modes which, without justification, subordinate truth-values to the other universally valid values, instead of coordinating these last properly, and subordinating them to the truth-values, which may be regarded as, *par excellence*, philosophy. If it must be allowed that Windelband seeks a theory of knowledge, it must be said that he does so only in a peculiar sense of the term. He deals not really with the question wherein truth consists, but only with the way in which man reaches it. His task is thus not one as to theoretic truth, nor yet a psychological one, but one as to theory of knowledge, or theoretic knowing, in the peculiar sense in which that is meant by him. "Peculiar," I say, because he treats laws and categories which are usually taken for truth, as mere means thereto. He holds to the doctrine that judgment is an act of the will *par excellence*, emphasizing our spontaneity in the outgoing of this will-moment in knowledge. In this way he hopes to found a primacy of the practical reason in logic. Windelband fails to realize that the truth-value is a higher inquiry than that after any of the other universally valid values, and so he unwarrantably inclines to coordinate it with them in an untenable way.

There are many defects and inconsistencies in Rickert's value-attempts also, although I am not now called on to detail them. His attempt, however, to equalize the logical and the ethical conscience is, it must be said, a very strained and unsatisfactory affair. He expressly says that the *Sollen*, as object to the judging subject, is not something to be understood, or to be thought, but a *Sollen* which is transcendent, does not exist as fact, but is timelessly valid. He sharply opposes it to being. The *Sollen* is not pure value, he says: value belongs to the *Sollen* only as it is related to a recognizing subject. Truth, to Rickert, is nothing else than recognition of the *Sollen*. Now, an unknown logical *Sollen* interpreted through an unknown ethical *Sollen* seems to me a case of *obscurum per obscurius*; the logical conscience, we are told, is only a particular form of the ethical conscience in general. The theoretic function is, on Rickert's philosophy of values, erroneously reduced to a practical one, by the object of knowledge being taken, not as that which is, but as that which ought to be. Rickert's is no more satisfactory than was Fichte's attempt to condition all theoretic knowledge on moral law, in crass neglect of the natural order and experience. The fundamental concept of ethics, it is said, becomes in Rickert's way raised to the dignity of the true! How *can* that be, when, on his own showing, the true only reaches its own dignity as drawn from duty-fulfilment? The dignity of the true he has already destroyed by his reduction of the logical conscience—a procedure which leaves the knowledge-problem quite unsolved. A transcendent *Sollen* will not satisfy the metaphysical view of things and their profound unity, which certainly cannot be subsumed under our moral experience. This would make the human spirit, with the values Rickert provides for it, a simple monstrosity in such a world as that we have on our hands. Duty does not call us to transcend consciousness in the absolute fashion projected by Rickert; such an *ought-to-be,* detached from all thought, feeling, and will, belonging to an absolutely transcendent order, is neither necessary to knowledge nor consonant with it. Knowledge belongs to the real order of things, in which the object exists independently of the cognitive act. It is not the case, as Rickert pretends, that knowledge has to do only with the ideal, not with the real: knowledge is a thing of individual experience, and not referable to an abstract and fictional *Bewusstsein überhaupt,* correspondent to nothing in reality. Such knowledge of the world of reality gives truth or existential judgments, not judgments of value. Rickert fails to do any manner of justice to the world of natural reality. Obviously, the entire procedure of Rickert would make the truth-value an ethical value, as one finds already suggested, long before, in Ulrici (*Gott und der Mensch*, Vol. II, pp. 131-136). Although Ulrici makes truth an ethical idea, he does not mean to deny that the universal logical categories are truth in the form of concept; but he chooses to concern himself too exclusively with truth as it comes to consciousness in us; and he makes it an ethical idea, as desired by us as beings of an ethical character and determination. Whether in this he does justice to the place and functions of reason and intellect in the apprehension of truth is another matter, and one on which I am inclined to think he lays a rather onesided ethical stress. But such a stress was rather unusual in 1873. In the strange fashion already described does Rickert try to carry out his idea of making the theory of knowledge the base of all philosophy. His theory of knowledge is, of course, ethically swamped. His conclusion, unsatisfactory enough, is that our knowing rests upon a resolution of the will. Surely a not very theoretic *finale*. The perception of truth is, in my judgment, far too completely an act of the intellect, not directly dependent on the will, to belong, in any primary fashion, to ethical character or choice: one believes on evidence, and has no choice in the matter. Rickert actually takes the position that for the man who wills not truth, its validity is not to be grounded. That is true only where consent of the will is called for, in respect of ethical truth, that there may be harmony of the will with truth already known by the reason. The sphere of ethics ought to be distinguished from that of correct thinking. Instead of which, Rickert reduces the truth to the good. Rickert is thus found, in his whole position, badly confounding the psychologically real grounds of judgment with the logical grounds of the truth of judgment. But the logician does not admit that subjective desires and prepossessions have to do with truth. The truth of a logical concept is, to him, independent of experience; a concept may be a true concept, apart from whether anything real corresponds to it. Eternal truths, he holds, have nothing to do with the subjectivity of the individual. Rickert fails to recognize knowledge of being, because he does not fully distinguish pure logic, or theory of truth, from theory of knowledge, or noëtics. Not psychology, but logic, has to do with absolute, unconditioned truth.

Truth, so taken, is no factual affair, and does not belong to space and time. Truth is eternal and independent of the judging individual. Husserl not only contends that truth is above all temporality, but holds the absolute truth and validity of logical laws, concepts, and judgments, though with his positions *in extenso* I am not here concerned. Volkelt has urged that it is reference for proof "to a somewhat, separate from us, and not possessed by us, which gives their peculiar significance to the expressions of certainty and logical compulsion." Bradley, whose discussion is valuable albeit he does not at all points express himself quite consistently, says "truths must exist in a mind"; "but the truth itself does not consist in its existence in me"; yet he adds, "truth may not be truth at all apart from its existence" in "finite subjects" (*Essays in Truth and Reality*, p. 87). To the last expression, some exception may certainly be taken, in the light of what has been already advanced. He does better when he says that though he "can find in truth the satisfaction of a want," in which case "its existence" in himself depends "at least very largely" on the will, yet he "cannot regard its nature as subject" to the will (*ibid.*, p. 87). The step which Bradley rightly refuses to take was taken by Münsterberg's voluntarism, which takes truth to be won by willing, by our creative activities. Truth is thus created, not copied. The doer, or, it may be, the deed, not merely finds, but, on this theory, is, the truth. No satisfactory theory of the objectivity of truth is possible on such a basis. Even the voluntarism of Royce holds, in a very objectionable form, "that all truth is indeed relative to the expression of our will," although "the will inevitably determines for itself forms of activity which are objectively valid and absolute" (paper at the Congress of Philosophy in Heidelberg, 1908). It appears to me that to mix up the will in its action in this fashion is to make the truth question no longer a logical one at all. To that I shall return presently. Bradley, of whom I have spoken, goes on to maintain (p. 88) that truth, like beauty, is, from one side—the side of essence—independent of the will, although there is another and practical side in which truth involves need and desire. In this sense, truth is "the satisfaction of a want" (p. 87), but there is truth, for all that, which transcends individual life. The objective and transcendent character of such truth was already finely expressed by Augustine. Thus truth is "at once dependent and free." Says Mr. Joachim, "independent truth itself" yet lives in "finite minds," but it does not so, in my view, simply and solely *as* my thought. All this amounts to what I prefer to designate as truth absolute and truth relative, and it is with the former aspect I am now mainly concerned. Truth in this absolute sense is, in its essence, eternal: truth is not made by us, as James and Dewey have maintained. I hold, like Bradley, their supposition to be absurd and untenable. I do not "make" truth save in the subjective sense that, but for my mind and truth's entering into it, truth would not exist for me at all. But truth itself I have not "made"; no more can I destroy it; and the objection that there is no objective or independent truth cannot be sustained. It is the nature of truth, not its supposed "making," that concerns us.

Essential truth is not man-made; there is inherent absurdity in the supposition, as Bradley has sufficiently shown. Schopenhauer held that truth is the reference of a judgment to something outside itself, as its sufficient ground, while Hegel thought that by truth was chiefly to be understood that I *know* how something *is*; this is truth only in relation to consciousness. Kant, Hegel, and Kuno Fischer regard truth as consisting in the agreement of the concept with its object, as did J. E. Erdmann, to whom "that is true which is known as it is." But, for all the talk concerning the *adaequatio intellectus cum re*, it will be found, I believe, that we are more indebted to Aquinas in this matter than to any subsequent philosopher whatsoever. And in all these cases, the "object," I contend, must be far wider than actual reality, as we shall see. I do not agree with Lotze that truths exist only in the thought, of a thinker, for there is truth that is before him, and waits for his finding or discovery. It is this objectivity of truth that has impelled to truth's quest at all times. Lotze, however, thinks the mind "only recognizes truth in as far as it belongs to its own nature from all eternity," a somewhat far-fetched connection; "truth that was originally unconnected with it," it could not "comprehend"; "it cannot be external to him, who is to recognize it"; "its recognition is only thinkable as cognition of our own being in it" (*Mikrokosmos,* Vol. II, p. 698). But the externality of truth need surely not be such as to keep us from knowing it, any more than the externality of nature prevents our recognition of it: in both cases the mind is destined to knowledge; in the case of truth, it is made a real and inward possession. But I should beg to be excused from taking Bradley's "I have now a toothache" as a sample of the eternality of truth (*Essays in Truth and Reality,* p. 340), because both it, and the reasons supporting it, appear to me absurdly inadequate. I hold truth to be one, and reality one, but the unity of truth—the congruous and harmonious character of all truth—is not to me the unity of a whole made up, by treating truth as an existent, of partial truths, all of which, as parts of a whole, are only partially true. There are many concentric circles within the orb of truth. But, in the view I am speaking of, "the true" is said to be "the Whole," short of which no isolated truth can be completely true. This whole, however, is supposed to be an organic unity or significant whole, "all its constituent elements reciprocally" involving one another or determining one another's being. Such is the supposed whole of truth, short of which no truths are perfectly true. This theory of truth has too many difficulties, some of which I am now pointing out, while some have been dealt with by Mr. Bertrand Russell (*Proceedings of Aristotelian Society,* 1907), and some by Dr. Aveling (*Proceedings of Aristotelian Society,* 1915) for it to be satisfactory. There are many isolated judgments or single propositions which, as Russell remarks, must be held "true in a sense in which their contradictories are not true." Those propositions I take for true, which are in character universal, and not particular; the particular is immediately experienced, and neither asks to be, nor can be, proved. No particular truth, indeed, is true, except through universal truth. But the general truth is not derived from the particular truth; such is seen to be the case in such a general truth as that all the diameters of the same circle are equal. Bradley makes truth ideal, yet practically treats it as an existent, and merges it in reality. But even when truth is taken as value, such value is valid, but not existent. But truth is to Bradley in a sense a failure, since it comes short, in the view of his *Appearance and Reality,* of being "quite identical with reality", in which latter it may even be "swallowed up". But this cannot be, since truth is about reality, with which it is not to be thus identified or confounded. Truth is not to be, as Dewey has said of Bradley, "a sort of transcendent essence on its own account" (*Mind,* July, 1907, p. 334).

Truth is not merged or transformed into reality; completed truth must still be truth, and not a merging in the concrete whole, termed the Absolute. There are primary and self-evident truths or principles which are recalcitrant to such a mode of treatment, as connected only with concrete reality. It is said that "truth is a word which has no meaning without the implicate of reality" (G. T. Ladd, *Theory of Knowledge,* p. 58). Now, when it is said that truth and reality are correlative, or that truth is the intellectual equivalent of reality, though the range of the correctness of the statement may be obvious, yet it is not to me wholly satisfying, since it involves reality being taken in a sense so unusual as to seem unreal. To make it satisfactory, we should need to extend the sphere of being or reality so as to include truths that seem unreal in a merely factual sense. The figures of geometry, for example, must be held real, as being the true ones of conception, a point which Mill failed to appreciate. Erdmann is therefore found saying that a so-called actual parabola is none, while a true one is that which is found in its formula. Locke strongly held mathematical truths—of figures and their properties—true and real apart from all "real existence in matter." The universal thought-forms, as in logic and mathematics, severed from all determinate content, can be object of thought and inquiry, and are then neither unreal nor untrue. Their objective truth and validity cannot properly be denied. They are no hypotheses, framed to explain determinate appearances. Such thought is still a fact of mental life, valid and indispensable. The question is one of theory of knowledge, not of metaphysics. We may say their objective validity is *sui generis*, but the judgments belong to the sphere of truth all the same, and no theory or system of truth but must take full account of them. Factual truth means that the quality of the facts is such that they are true. But truth cannot be confined to brute fact; there is also propositional truth, to which being cannot without stultification be denied, if any comprehensive view of truth is to be taken. This seems necessary to remember, when we are told that all truth "must be referred to the test of reality" (G. T. Ladd, *Theory of Knowledge,* p. 454). Of course, I admit, in what has been said, that being real imports more than simply being, which latter is the widest and most fundamental category. Rosmini held that, in the last analysis, the truth of a thing is just its being. Truth and being were to him equivalent. The truth of knowledge was, to him, known being. What was conformable to ideal being was, for him, true. But such a complete identification of truth with being, as Rosmini made, cannot be held admissible or correct, since truth is not being, but only a quality, property, or attribute of being. We see, then, that there is objective truth in itself as well as truth for us.

Again, when it is contended that truth means such a judgment as corresponds to the being of the really existent, we may again feel that this reference to existents, however we may have to accept it, does not seem satisfyingly to cover the whole conceivable range and extent of truth. Of course, a truth is not truth, if it be not real, and so we are haunted by the shadow of reality again, and yet the truth may be so ideal that the thought of the really existent is repellent in such a connection. Yet there are important thinkers to-day who allow only those judgments to be true, of which the objective fact is really existent. Surely there are evident judgments, where no concrete actuality of the objectives are concerned, that cannot be false. Mathematics and formal logic are examples in their remoteness from ordinary reality: truth, in their purest results, springs up in independence—it might even be said, because of the independence—of real existents, since they both belong to the sphere of things not seen. Why, then, can it be quite satisfactory for philosophers to keep on binding all truth to association with the really existent? These truths — I mean, of pure mathematics and formal logic—may be pure abstractions, but you do not deny them the name of truth, because they are abstract and independent of reality, even though they not be incapable of being brought into some sort of relation to, and bearing upon, reality. I am, of course,well aware of those philosophical quarters in which it is blankly denied that there is any abstract truth, or truth in itself, but I do not think such denial is conformable to true reason. The truths of pure mathematics and formal logic, of which I have been speaking, are completely and unconditionally true, independently of their place in this or that particular mind. So absolute are the truths of pure logic that to deny them is simply to reassert them in new form. Royce seems to me right in claiming that recent thought and discovery in respect of the system of geometrical truth, and the sphere of logical analysis, tend to a more rigid and objective conception of truth, to fundamental thinking. There was no occasion to mar this statement by tacking his absurd absolute voluntarism on to it. The truth-relations seem, in such cases, to be, in a sense, absolute; one may at least say, free of contingency and of caprice. Yet the Absolute seems to me a conception that goes beyond mathematics as concerned with the quantitative, which, however indefinitely expanded, is no more than one form of the infinite.

But the independence of truth is to be seen in the world of concrete reality also. Prof. Lloyd Morgan, in an able and interesting paper (*Proceedings of Aristotelian Society*, 1917), concludes to the presence of extra-mental "truth in the structure of the knowable world," which, he says, "may not yet be known—perhaps may never be known by us," but which "is there all the same"; also, "truth in the structure of the sphere of knowledge," marked by consistency; and finally, "truth as correspondence" of the two spheres—

knowledge and the knowable—just spoken of. He does not mean anything "static" by truth-structure, since the knowable world is in the making, under development and evolution. This line of thought does not necessarily help us greatly, as it stands, toward the determination of absolute and eternal truth. I mean, individual phenomena in the empiric world, simply taken, do not enable you to reach absolute truth, only supersensible law being the really true. But it is of interest and value over against the contention of James that "theoretic truth" dwells "*within* the mind." It militates in certain ways against the pragmatism and instrumentalism that make all truth instrumental and relative, and reduce truth to a biological and psychological value. Truth, in such a view, grows with our growth, and changes with our needs. Truth is, on this theory, just our control of the objects of experience, and that is the use of scientific hypotheses. The truth of ideas lies in their empirical value, in how far they "work." This is made the sole criterion of truth. Truth is a mere social product, to this view. A useful enough aspect of truth, so far as it goes, but inadequate, as a theory of truth, since it is too individualistic, and never gets so far as to become objective, and supra-temporal in significant import; it is one which was not wholly absent from Socrates, the Sophists, the Stoics, and the Epicureans, though developed and set in novel forms in our time. But the true in itself is not sought, nor believed in; what is true is true only for the subject; individual instinct figures too largely in pragmatist knowledge, instead of the theoretic knowledge which seeks after universal rules. But will does not make a knowledge-content for truth; truth in its objectivity is independent of the knowing subject's acknowledgement of it. Akin to the pragmatist view is that of Höffding when, in his *Problems of Philosophy*, he makes truth a dynamic concept, as representing the application of mental energy; but this is only one side of the truth, and is defective in respect of the other aspect, on which I am insisting. It is mere gratuitous dogmatism when Höffding says every static aspect of truth must be given up in favor of practicality and working-value. His view, true so far as it goes, remains unconvincing, subjective, and lacking in grasp of truth- or reality-values. Lloyd Morgan's view, which I have touched upon, is objective over against such subjectivity, but his view is also evolutionary, and, in some senses at least, relativistic. Says he, "Ask the physicist, the chemist, the physiologist—ask any representative man of science—where truth lives and has its home awaiting discovery, and he will say it is out there in that which it is his special business to interpret." So little does the scientist "make" truth, or even empirical truths, and the scientific conscience will remain refractory to being subsumed under Rickert's ethical conscience.

It may be noted that in Dr. Schiller's rhetorical declamations against "The Rationalistic Conception of Truth" (*Proceedings of Aristotelian Society,* 1909), he is really concerning himself with how truth is in the subject; he is simply speaking in a different tongue from those who contend that truth is objective and independent, and signifies agreement with transcendent reality. Refutation can obviously not be effected by him in such a way. The truth is, that in our knowledge of the objectively real world, taking reality in its widest sense, as in our knowledge of the ethical world, we run up against standards of truth that are absolute, and try in vain to rid ourselves of truth which is absolute and eternal. In these realms we come upon truths, axioms, principles, laws, and ideals of reason which are universally valid and eternal. These carry for us objective validity as principles and laws of things, and as norms that regulate all thinking and all knowing, because in them reason is realized. Logical laws, like the law of identity and the law of contradiction, suggest themselves

as examples. Logical axioms are universal, because
not true because universal. In these, as in the ca
absolute truths in pure mathematics, I believe, with R
as against Royce, that we must hold the truths quite
pendent—in their absolute truth-aspect—of our cons
tive processes. The relations of numbers, or such a s
ment as that two straight lines cannot enclose a space
examples of a condition of things not to be altered wi
contradiction, by any will-determination of ours wh
ever. As truths of reason, their contradictories are in
sible. Of course, the objectivity of number carries no
tial signification, as Dr. A. T. Shearman properly
(*The Scope of Formal Logic,* p. 139). Besides, the t
of number are independent of all time and circumst
and are not of the nature of real existents: their re
consists in their validity. These are the positions
tained by Bolzano, by Lotze, consistently or not in his *L*
and by Husserl. Again, if we make truth consist i
agreement of the subject with the object, we see the
culty of this in the ethical sphere, where the object
real or concrete affair. It is another proof that obje
reality must, as I have contended, be taken in a far
sense than philosophers have done—must be taken to
an object physical or mental, apart from the percei
mind. Whatever the nature of the object, our thoug
true because the object is as we think it. So far well
I do not think we have sufficiently probed the true
we have, in current philosophical fashion, made it the
reflection of being, and have not regarded it as somet
which has itself being.

There has in recent years been a quickened intere
the nature of truth, which is good to see; but I am
means sure that any great or satisfying philosophica
vance has been made. There is still need, as Le
pointed out, not to be content to consider truth "fro

outside and merely to call it by its name, but penetrate into its recesses and perceive distinctly the logic and harmony contained in it." But the current conception of truth as agreement with reality does not seem to partake greatly of this inward character, for it regards thought and thing as two very isolated terms, and makes truth consist in the mere agreement of the former with the latter. But knowledge or thought is thus a mere pendant of things, and deeper or anterior aspects of the true do not seem to me to be reached in this way. I mean, there is truth of being—ontological, or if you will, transcendental truth — not reached by such posterior descriptive knowledge. But, although truth is invoked in being, the concept of truth is not to be thought of as involved in the concept of being: the distinctiveness of each is to be maintained. Truth is essentially inclusive of being; the form of the true calls, by its very nature, for being. These remarks are corrective of Rosmini's view, already referred to.

Not much has been done by pragmatism toward a coherent theory of truth, and the efforts of Bradley and others toward a monistic theory of truth—a logical monism resting, in a certain way, on an ontological monism—is by no means in all respects satisfying, as I have shown. Unity of truth, no doubt, we must have, but whether it is to be such a simple unity—organic in the sense meant in that theory—or whether it may not be the unity of harmony, mutual consistency or agreement between different grades or circles or levels of truth, is the question. Bergson also, it should be noted, is fundamentally preoccupied with existence, to the neglect of pure thought, as in logic and mathematics, so that I conceive his theory of knowledge and of truth to be defective. I am by no means sure that the modern attempts at simplicity and unification, in respect of truth, are improvements upon the forgotten efforts of the older philosophers. They saw the difficulty of arriving at a single definition of truth, its significance being so wide at the fullest, and the forms of truth so diverse and variant. But they viewed truth, in whichsoever of its many forms found, as always expressive of some sort of equation or correspondence, although I do not think even this covered the whole case for truth, as I shall presently show. They distinguished between the different kinds of truth, however, and surely philosophy is still concerned with definition, distinction, and difference, through which alone satisfactory ultimate unity can be reached. Some of them enumerated logical truth, or the correspondence between thought and its laws; conceptual truth, or the correspondence between thought and object; ontological—sometimes termed transcendental—truth, or the correspondence of thought with being; and moral truth. But the true was practically regarded as matter of posterior knowledge or aspect only. Others spoke of *veritas entis, veritas cognitionis,* and *veritas signi,* while yet others made the distinctions of "entitative," "objective," and "formal" truth, the last including signs. They all recognized the importance of the fundamental category of being, as the ground of all truth—that truth "by which a thing is what it is"; and we have need to recognize the manifold senses in which we still speak of being or reality.

Truth may be the simple equivalent of reality, so long as you are only speaking of things, but there is wider reality than that of things, and to this wider reality truth or thought is related. Indeed, Schelling preferred to understand truth as agreement of a thought-content with itself, rather than agreement of thought with an object. But this latter has its truth and value, and it does not seem that it can be set aside in this way. But it is not enough to say that that which is, has truth of being. If we say the object of my thought is always reality, then reality must be more widely taken than concrete reality. Would the logician think of denying, in respect of thoughts or of feelings, that they exist — have truth of being? The reality of thought lies, of course, in its being thought, the reality of feeling in its being felt. In like manner, we say a law or a relation exists or is real, but its being or reality is not that of things. But would the older procedure be sustained to-day when it said that a concept, which had admittedly truth of being in it, was not a true concept, because no reality existed corresponding to it? Conceptual truth only, if you will, but still truth after its kind. If the logician thinks a truth, which is necessary to thought, but has no outward reality existing corresponding to it, is his truth to be held, as in the older view, not true? Must we not recognize that there is a truth or logic of consistency, as well as a truth or logic of factual experience? In which case, the accordance of the notions—whose laws of reality are derived from reason—is the criterion of truth. This is knowledge through judgment or reflection, into which error may enter through default of reason, while the other case—that of the object in perception—is knowledge by intuition. But not even experience, properly conceived, is tied down to truths or judgments that relate to reality, in the ordinary sense of that term. Reality should therefore stand for anything that may affect consciousness, whether it be a fact of nature, or a mental fact, standing apart from the perceiving mind. Surely if truth is to be taken as correlative of reality, reality must be construed in a very wide sense indeed, if there is to be a thoroughly consistent procedure in dealing with supposed being or reality. At any rate, what many-faceted terms being and reality are, must be more taken account of in truth discussions. Something more is required than merely to talk of "the thoroughgoing unity of reality," when it is evident that reality is being restricted to one particular sense, that of outer reality. But the fact is that truth is really that to which reality should, in essence and character, conform or correspond, rather than something that, less satisfactorily, must conform to reality. For there cannot be reality—whatever appearance there may be—unless the true has anteriorly gone to the making of it. It is the losing sight of this inner aspect of the case that has made truth remain the outside affair—defective, as Bradley admits, because it is merely "about" reality—it has been so much allowed to be. But truth is that transcendental quality of being which relates it to intellect. We have no right to neglect the other side of the shield, the *adaequatio rei cum intellectu,* as is almost invariably done. Things are true through a first or primal truth which made them what they are, and that primal truth any adequate or thorough theory of truth must seek to win, or at least to recognize. The truth of first principles belongs to such primal truth.

Now, in the case of such divisions of truth as have been considered, it has been said that they are unified in God who, as the supreme or transcendent truth, is each of them without limit. But that is scarcely a satisfactory procedure, since what we are seeking is a coherent system or view of truth to human apprehension. There are inherently good reasons for not now wishing to consider thus truth in God, where it is all-embracing and infinitely complete, but as we may systematically apprehend it. It is not satisfactory to say with Lotze, in his *Logic,* that "truth and the knowledge of truth consist only in the laws of interconnection which are found to obtain universally within a given set of ideas." This is characteristically a too subjective mode of putting the case, in which ideas figure too much as divorced from reality and experience. I mean, it seems to me too conceptual, too little ontological, in its mode of representation. This task, though it is not now my main concern, must involve taking account of the vast connection of all knowledges, and the linking up and binding together of individual truths, into a perfectly harmonious system or synoptic view of truth. I have already spoken of the unity of truth, and unity spells such connection. In this systematic whole or universe of truth, each individual truth, having a value in itself independently of its significance for the whole, has its place and worth; for there it ministers to the highest end or purpose of the whole. But the whole is no mere aggregate or sum. I am speaking of what may be eventually regarded as a metaphysical conception or view of truth.

We now see what kind of value, if value it should be called, truth may be taken to be, namely, a real spiritual appearance, pure, untroubled, objective to, and independent of us, and ideally reached or apprehended by us. Truth is in this sense absolute. This is, no doubt, truth in the abstract, but it is truth with which I have chosen to concern myself, in maintaining that it is not value, in the sense in which we commonly speak of goodness and beauty as values. We may call it truth- or reason-value, no doubt, meaning that it simply is. It is truth which is not affected by the influence of feeling upon our actual thinking. It is truth whose validity is self-evident, or if you will, self-existent. It is somewhat incorrect to say of such truth, as Dr. Schiller does, that "there is no *knowing* without *valuing*" (*Humanism*, p. 10). Such truth as I have been speaking of remains truth, did we neither know it nor value it. As value exists only for a conscious subject, truth in this sense should not be called value, and our knowing it is not necessarily valuing it, in any proper sense of the term. It awaits no consent of our will to its being true, but demands acceptance *nolens volens*. All truth is logical, so far as it is truth, though logic is, of course, concerned only with the formal aspect of truth. It is not a source of material truth, which is found in experience. But there is a relative aspect, in which truth has a relation to us—in a subjective sense. In this sense, truth may be viewed as a species of value, as it becomes the satisfaction of a want in us. In this connection, I am, of course, not concerned to deny the pragmatist contention as to the part played by feeling upon our thought, when forming our subjective conceptions of truth in practical life and action. But even there, the transcendent element in knowing should not be lost sight of. Nor is the objectivity of truth or knowledge to be sacrificed, even as was done by Lotze, when he admitted "the completely human subjectivity of all our knowledge," and held that "this universal character of subjectivity, belonging to all knowledge, can settle nothing as to its truth or untruth" (*Metaphysics,* Vol. I, p. 220). The world of reality is not so lost to us that "the changing world of ideas" is all we have to work upon.

But I return to the primacy of the truth-value, with which I started. That primacy cannot be surrendered to those who would reduce the true to the good, or subordinate it thereto. The truth-value is, in my view, to be ranked as conceptually prior, and superior in quality or excellence, to the values of goodness and beauty. The priority of truth is seen in the fact that, in expressing what simply is, it states the ontologically true; it is in closer relation, so to speak, to being than is goodness, which latter waits on desire, which is absent from the concept of being; and in its appeal to reason or intellect, the true is apprehended by the highest, divinest faculty in man. Goodness comes naturally and necessarily after truth, because, in its appeal to feeling, will, and desire, it is constituted by what is of the nature of addition to the true. This is so, because the good is appreciated by the reason or intellect also, seeing that a good, to be desired, must be known and recognized or understood. In other words, more than being or existence is involved in the idea of the good, as the object of desire. Truth has to do with being simply; it is more simple, more abstract, more absolute, than the good; goodness is, in some sort, a desirable accompaniment of being. That is to say, there is a connotation in goodness not present in truth as concerned with pure being. Yet the true is a good, and the good is something true. Lotze's metaphysical position, that truth is not the *prius,* but dependent on the realm of the good, is one which, in my view, cannot be sustained, because it imports very imperfect appreciation of the primal and absolute Reason, which is at the base and bottom of things. He thinks it is impossible (*Metaphysics,* Vol. I, p. 207) there should be "an absolute *prius*" of forms of any necessary sort, but with glaring inconsistency makes metaphysical truth depend upon a world that rests on the principle of the good, so making the form of the good a preexistent affair after all. As if the ascription of good would endow truth with an objective character which did not belong to it in itself! Lotze's whole denial of absolute truth is to be decisively rejected, as ill-supported and untenable: it is part of the relativity and subjectivity of his whole position. Truth, relative and empirical, is all Lotze has to give us. It is satisfactory to find Ulrici, to whom I have already referred, making the concept of the good rest upon that of the true, despite his treatment of the true as an ethical idea. Better, at any rate, than Dr. Schiller's absurd attempt to subsume the true under the good (*Humanism,* p. 11), which only a defective metaphysical sense could be content to do. For the good, as resting upon the true, is our rational end.

Dr. Schiller is by no means alone in the mistaken notion that the good is such an ultimate and unanalyzable notion; but it is quite delusive to suppose that the good is unaffected by any truth about what is real. An excellent example of this untenable position is afforded by R. L. Nettleship's view of the good, as held by Plato, as "the condition of the logical *prius*" of being, truth, and order, and not to be "identified" with any one of them. Whether the *ensemble* of Plato's teaching held such a rigid, clear-cut theory of the good, as is here represented, need not now be inquired into. But such a claim, by whomsoever made, cannot be sustained, such a priority of good being non-existent and due to misconception of the nature of the good. A good so anterior and unrelated to anything, and so undefined in character, cannot be satisfactory. I have already spoken of it in connection with Lotze. We must not overlook the criterion of the good, as "something that must," as I have said elsewhere, "be determined by the laws and ideals of reason" (*Studies in European Philosophy*, p. 339). The good "presupposes the true, and the knowledge of it is founded on being" (*ibid.*, p. 339). We have no right to give an irrational cast to ethical good, or to be led by bad psychology into grounding moral distinctions in feeling rather than in reason. The good desired must be ideal good, desired for its own intrinsic worth and value. Such good may be, and indeed is, universally valid, but there is nothing, in the nature of the good, that detracts from the primary character of the truth-value, as applicable test of all objects as well as all subjects. We may say, with Aquinas, that there is a sense in which every entity is true, but it is manifestly absurd to try to confine true and false to mere propositions. In plain fact and actual usage, the true is often taken, broadly, as equivalent to the real. If we speak of true gold, it is because there intelligibly is false gold; if we speak of true hair, it is because there is, in a significant sense, false hair; into the character of these and similar falsities, I am not now concerned to inquire; it is enough to note that there are intelligible and important senses in which the truth test can be applied to objects, and is not confined to propositions. True as an entity in one sense may be, it may be false as related to our thought.

I turn from goodness to another value, that of beauty. Beauty may not be a transcendental quality of being, but the concept of the beautiful follows certain transcendental concepts. Beauty is very closely connected with the true and the good, both of which it presupposes. But the beautiful is not synonymous with the true, since there are many true things that are ugly. Neither the true nor the good is necessarily pleasing, as is the case with beauty. Not Keats alone has identified truth and beauty, but many philosophers also. This, I do not wish to do, but to maintain a distinctiveness for beauty, as was done by Kant and Schiller. We cannot say, "beauty is truth, truth beauty," making a blank identity of them; we must explicate the senses in which both terms are to be understood in making such a statement. Not only must we avoid the mistake of making truth and beauty identical, but shun still more the folly of those who would rank beauty above truth. Even Hegel was too much inclined to treat truth and beauty as one and the same, the beautiful being but the shining manifestation of the idea—a true but incomplete account of beauty, though his theory is of high value. The close connection of beauty with the true is seen in the appeal of beauty to reason or intellect in esthetic contemplation, where even Schopenhauer proclaimed the absence of will, as in the case of the good. Ultimately one must hold beauty to be a revelation of reason, reason in a sensuous form, for it conveys truth or thought of reason. This is not to be wondered at when we consider such elements as completeness or perfection of parts, order or proportion, etc., which engage reason-elements of appreciation. We may rest in the beauty of a great picture, but it is, at the same time, expression and token of truth. But desire is not here active, as in the case of the good, though Baumgarten did postulate excitation of desire; our delight in beauty springs from contemplation, apart from possession; in such apprehension of beauty, the powers employed are very largely those that belong to reason or the cognitive order, although Kant thought there was also present a harmony with striving and purposeful endeavor. Esthetic feeling is consequent on the primary intellectual apprehension, so that there is a reason-feeling in the perceiving subject. But that does not mean that beauty is not to be loved for its own sake or intrinsic worth. While beauty has its relative aspect or truth, yet objectivity and universality can be claimed for the beautiful. Beauty is thus what Bradley called "the self-existent pleasant." But the appreciation of the beautiful is not self-grounded, but rests on truth of being. It is appreciation of an ideal—an ideal of perfection perceived in the object.

Already in Plato it was seen what beauty alone could do for our knowledge of the good. But beauty is not synonymous with the good, for there are good things which are not beautiful. We do not apply beautiful to the objects of taste, smell, and touch, all good in their way. Goethe ranked the beautiful higher than the good, as being inclusive of the good. The beautiful and the good have sometimes been taken to be identical, the beautiful being regarded as the more ultimate in its freedom from the striving which marks the good. It does not seem to me either a very critical or happy attempt at identification. The emotion of beauty is to be distinguished from the sentiment of the good in quite a number of respects. We cannot, as some philosophers do, subordinate beauty to the good, of which it is said to be one form. It has been properly pointed out that when men speak of the beauty of the good, they are not speaking of beauty "in the specific sense." Its distinctiveness must be maintained, close as their kinship or connection may be. It does not seem to me that we have any right so to merge natural beauty in the morally good. The ideal of beauty and the ideal of the good are not to be so merged or lost the one in the other. Feeling, in the case of the good, is of more reasoned character: feeling, in the case of beauty, assumes a more sensuous form. Lotze placed beauty midway between the true and the good, but thought it neither solves the theoretic problem of the true, nor the practical problem of the good. A rather obvious reflection, it must be said. But he thinks its mid-position may point to a possible reconciliation of existing contradictions, which does not seem to me to carry us very far, as merely thus stated. But more meaning attaches to the suggestion if and when analysis yields, as features or characters of esthetic emotion, such points as unity in variety, proportion, symmetry, harmony, individuality, and so forth, and if and when the part played by perception, feeling, and imagination in the pleasurable and disinterested contemplation of the beautiful, is considered. In such wise it grows more apparent how the esthetical problem can assume aspects psychological, epistemological, and ontological, which relate it more nearly to the problems of the true and the good than might at first sight appear. To go into that fully would require a discussion by itself. At any rate, being is the seat of value, and not even beauty can be considered without account being taken of the metaphysic of esthetics. Beauty must always have truth of being. But what here concerns us is to say that there is nothing in the problem of beauty that impugns the primacy of the truth-value.

I have held the truth-value to be primary, but I have not meant to suggest that goodness and beauty are merely values to be deduced from the truth-value as fundamental. Central in importance as I take the truth-value to be, to which the other two values are, in a sense, subordinate, yet I think all the three values should be coordinated with each other, and their relations and the character of their absoluteness, marked out. In other words, a reasoned *Wert-*

gliederung is our main need. But our leading philosophers speak of values without attempting any such articulation of the values, which they uncritically assume as common sense or mere face values. There is no such thing as an isolated value, every value standing in a system of higher and lower. Objectivity we may claim for all the values, truth, goodness, and beauty, but, in doing so, must remember what a unique and irreducible form of objectivity value is. We must beware of the folly of predicating value of value, as sometimes happens, without any being or reality to which value belongs. Value does not hang in the air in such a fashion, although religious writers on value sometimes notably offend in this way, and occasionally philosophical writers who set an overweening value on value. Even if we hold value to exist before the entrance of desire, yet value is only given for an existing consciousness; without this possibility, a value would be nothing. Nor should we forget that the objectivity of truth is one thing, not to be confounded with the objectivity of either goodness or beauty. If we are to confine ourselves to the truth of experience, it must be experience in the widest sense, as experience of, or in relation to, the transcendent, or what is above mere experience, if any speculative results are to be at all possible to philosophy. For "the concept of experience is itself transcendent of experience, and, in the nature of the case, could admit of no empirical verification." Philosophy is not mere crude empiricism, even if christened "radical," and the question of ultimate truths and principles we have found to be far from an idle or unanswerable one. We have seen that value is always for a subject, but the strange fact remains—one difficult of reconcilement—that value does not yet come and go with the subject that experiences value. Hence some speak of potential values. Of course, there are over-individual values, though they cannot be for us so metaphysically real as those the subject strikes for himself. There is no satisfactory formal logical or metaphysical principle for the grounding and unification of cosmical values, outside the unity of the subject. You can, no doubt, make value ultimate, more ultimate than existence, but your doing so can never convert a value-judgment into a truth-judgment. When it is thought that values are objective, if they are posited in true value-judgments, the position is an untenable one, because all subjective values, just because they are subjective, must find expression in what are really, *sensu stricto,* false value-judgments. There is no value, properly speaking, outside the world of desire and inclination. Ehrenfels regarded the value of things as due to our desire of them, while Meinong has taken value to be prior, since desire relates to what is not yet present. If value, however, stands or falls with desire, then is value purely relative. Because this is unsatisfactory, the objectivity of absoluteness of the values has been postulated, with variously estimated satisfactoriness. I am inclined to regard the truth-value or existential judgment as the only really absolute one, with what Rickert calls "its category of givenness," and to regard the other values as non-absolute value-judgments. But that does not mean that the values of goodness and of beauty are not absolute in the sense that they are universally valid. If the good be severed from the true, then the objectivity of the good falls away; but the objective truth of the good cannot be so dispensed with; the good has an absolute value, because there is objective good, good that we can isolate in thought as existing in and of itself, and which forms the absolute norm for our will. But this objectivity could not be, if the good were severed from the true, as objectively existent. And so it comes that the values of goodness and of beauty are sustained and illuminated by the truth- or reality-values, since they must be conformable to the truth of things, if they are to be conserved at all. This, because the content of the practical reason is still an object of inquiry and knowledge to the theoretic reason, even if you say that will- and feeling-values cannot be fully absorbed by this latter reason. When Mr. C. D. Broad says of the theoretic and the practical reason that "there is clearly no question of priority between them" (*Mind,* April, 1918, p. 242), that is an incorrect or defective view; for, in setting up the practical reason, it, with its contents, is, in that very fact, constituted an object of knowledge and investigation to the theoretic reason. It is not necessary that reason should absorb will- and feeling-values, or rob them of their distinctiveness. But is is absurd to suppose that it has not relation to them, or bearing upon them. The theoretic reason is not so divorced from the practical reason, however frequently this Kantian absurdity may have been allowed to permeate modern philosophy. Valuing, by means of the truth-value, and knowing, are loosely called one and the same; but the absolute value is truth, not our knowledge of it. Truth is the last presupposition of every absolutely valid valuation. But it is the first of all preferences, for truth is the most absolute of all things; it is the thought of God, as Kepler found, when he thought God's thoughts after Him. The unity of truth is such that truths are but different aspects or applications of one and the same truth. Truth itself is not multiple; but multiple are the aspects, degrees, and circumstances of its manifestation. Truth, entering the human mind, suffers the weakness of its position there; there is then diversity in the unity of truth. But truth, as it is in itself, is still one. The whole search of man has been for the unity hid behind these diversities. Truth presupposes unity. I do not merely say that truth is one, because God is one; but also, that truth is one, since man is one, and still seeks the unity of truth in its apparent diversities. Theory of truth is not to be lightly esteemed, for theory is truth itself, and not less rigid and inflexible than truth. It is scarcely possible, in view of what has been said of truth as one, to sustain the position of those philosophers who think there is nothing which can be called the truth, but only an infinite number of truths. For truths do not finally remain isolated and unrelated in the one system of truth. A wholeness of truth we must maintain, whether we can accept any of the proposed systems of truth in whole or not. We have seen that we may not say that a statement, which corresponds to no outer reality, is no truth; that there may be transcendental concepts of truth which we are not entitled to pronounce false; and that there may be statements which we find it quite impossible to doubt, and may have to take for true, though their truth we may never with full certainty be able to pronounce, since they really rest upon our thought. The contention of some philosophers that truth, without a subject that thinks it, is a mere abstraction, is scarcely justifiable, in view of some considerations already advanced. Nor is truth a subjective product, a creation of individual mind, though truth as thought, of course, requires a subject. The value of truth lies precisely in the fact that it is not value; that it is, as truth, objective, irresponsive to desire, and unmoulded by will; and that it is corrective of the terribly and detrimentally characteristic subjectivity of modern thought, which makes so much of the objectivity of value, and so little of the objectivity of truth. This, of course, while I have admitted the sense in which truth may be legitimately regarded as value. But there are truths which are necessarily taken for true; you cannot say that a triangle is a circle, nor a circle a polygon; doubt in such cases is impossible. Such truths are not value, in any proper sense. The opposite of any value can be affirmed; but the opposite of such truths could not be affirmed.

We have seen that there are leading philosophers who have contributed no more toward the discussion of truth than the idle repetition of Hegel's phrase that "the true" is "the Whole." As well tell men that truth is a hopeless quest. That is to remove truth as far as possible from being the central determining power, which I have shown it to be, in human life. If there is to be a whole of truth, one might have supposed it to come through the harmonization and unification of different truths, or levels or spheres of truth. Thus out of truths might spring a whole of truth. But if nothing is true short of the whole, if there are only untruths—truths not completely true—short of this goal, is our whole of truth to be reached by piling up this aggregate of untruths? Kant is even more unsatisfactory than Hegel. For of him we find Dr. Hutchison Stirling saying, "I know not that there is anywhere any truth accessible to Kant" (*What is Thought?* p. 39). Yet truth is not to be escaped. For, as said Aquinas, "He who denies that truth is, grants that truth is; for, if truth is not, it is still true that truth is not." For my own part, I prefer another method of reaching a satisfactory truth-conclusion than that of Hegel. If we take all the different forms, grades, or levels, of truth —logical, conceptual, ontological, moral—and treat them as truth, it does not seem to me at all difficult to conceive their reduction to a final and fundamental unity—a unity of harmony, permanency, consistency, and completeness, subsisting for a mind capable of comprehending, or at least conceiving, them, in their *ensemble* and *rapports,* as convergent, in spite of all apparent divergences and dispersions, toward one central *fons et origo* of truth. In the inexhaustible richness and complexity of truth, as issuing from this common source or center, is overtaken and included all that seems overlooked or imperfectly accounted for in the current talk of truth as concerned only with outer reality. If you say that such a knowledge or view of truth in its primal unity belongs to the universal order, and appertains in fulness to transcendental Being, I answer, So be it, but we are sufficiently universalized to be able to understand and appreciate the reality of such a view. After all, it should not be forgotten, when we speak of the unity of truth, that the idea of unity has no reality standing by itself, but is included in the idea of being.

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A COMPARISON OF BERGSON AND SPINOZA

WITH REFERENCE TO THEIR CONCEPTIONS OF REALITY AND KNOWLEDGE.

THE French philosophic tradition is predominantly Cartesian. It is to be expected, therefore, that Bergson, educated in this tradition and writing for the French people, should emphasize the authority of Descartes, that he should be at pains to insist, as he does, that philosophers have refused to move in the direction indicated by Descartes, and that the followers of Descartes have abandoned the most essential elements in the system of their master. When Kant affirmed that knowledge cannot be entirely resolved into terms of intelligence, he also, says Bergson, "prepared the way for a new philosophy, which might have established itself in the extra-intellectual matter of knowledge by a higher effort of intuition."[1] However, both Kant and subsequent philosophers neglected to do this. It remains for Bergson to give to philosophy a "revivified Cartesianism." Consequently it should not be surprising if there appear elements of essential agreement between Bergson and the Cartesians. This agreement will be most conspicuous between such as perceive that the Cartesian dualism rests upon a myth, and that, consequently, it must be grounded upon a more fundamental unity. Of those

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[1] *Creative Evolution* (trans. by Mitchell), p. 358.

Cartesians who attempted to reconcile this dualism Spinoza alone makes it explicit and converts it into a new and original philosophy. It is to be expected, therefore, that we shall find similarities in Bergson and Spinoza. In this paper I wish to consider but two. I wish to compare the answers of Bergson and Spinoza to the two questions, "What is the nature of Reality?" and "How do we know Reality?"

Shortly before his death, Spinoza wrote a letter[2] in which he says that he has become dissatisfied with Descartes's conception of extension and motion. He declares that he intends, if he lives, to restate these conceptions for himself. According to Descartes extension is originally a plenum of rest in which motion arose, unaccountably, as by a mysterious act of God. The conception which Spinoza offers in his *Ethics* is not far from this: he describes extension as an attribute of Substance, and motion as an infinite and eternal mode of this prior fundamental attribute. It is to be noted, however, that our author is very careful to make explicit the idea that extension like all other aspects of God must reveal him as operation, as action. This thought has inevitable implications which, had he lived longer, must have led him to define extension as such to be clearly and distinctly infinite activity and efficacy. However this may be, Spinoza indicates that by God, Substance, or Reality,[3] he means an infinite power, whose parts are "infinitely modified and compelled to undergo infinite variations."[4]

Thus, for Spinoza, Substance, correctly conceived, is undivided, all-inclusive, and manifested to man only as a twofold activity of thought and physical agency. This conception man attains by means of the complete and adequate demonstrative knowledge which is science, or by means of an intuition which is based upon science. It declares Substance to be eternal, immanent in and enveloping all space and all time, containing within itself simultaneously all that was, that is, or that becomes. Substance thus conceived, Spinoza designates as *natura naturans.* *Natura naturans* is the metaphysical inwardness of Substance which does not appear in the daily life.[5]

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[2] Spinoza's *Works* (Bohn Edition), Letter lxxii. Also see Letter lxx.

[3] *Ethics,* Part II, Prop. 3, note.

[4] Spinoza's *Works* (Bohn Edition), Letter xv.

There, thought and experience are of the Imagination, and by Imagination we view nature as *natura naturata.* It is only in *natura naturata* that we conceive individual things. The necessities of life require man to abstract, to cut out from totality the particular individual things by applying to them measure, time, and number.[6] A thing so detached from its context is the concrete individual of the daily life. But its detachment does not in any essential way alter its inner character. Its nature is still that which it has with its context: to be power, to be the endeavor to persist in its own being. It is a center of activity, continuous with an endless series of like active centers, acting upon and undergoing reaction from its peers in the aggregate of being, which is Substance.

For Bergson as well as for Spinoza motion is concrete and real. Bergson objects to the relative motion of geometry. He considers this artificial. It defines movement as change of distance and by implication permits the same object to be in motion or to be motionless according to the spatial positions to which it is referred.[7] Bergson reminds us that while Descartes thus defined motion when he spoke as geometer, his formulation of the laws of motion in physics assumes motion to be an absolute.[8] This latter conception of motion is the one which Bergson affirms. He would have us abandon the false conception of it which has prevailed since Newton and replace it with Descartes's conception, viz., that motion is a distinct entity, a cause of manifestations, and not an aspect of things. What is real in motion is an ultimate activity or movement that underlies the motion Newton describes and which his laws can only negate, not designate.[9] Direct evidence for the absoluteness and reality of movement occurs constantly, Bergson holds, in immediate experience. The essence of movement is mobility. Now when I see an object change its place, my sensation testifies to the reality of something effectually going on. I am further assured of this reality when I produce a movement by willing it. My muscular sensations assure me that movement takes place. Such a movement appears as a change of state or quality. "But then how should it be otherwise," says Bergson, "when I perceive changes of quality in things? Sound differs absolutely from silence, as also one sound from another sound. Between light and darkness, between shades, the difference is absolute. The passage from one to the other is also an absolutely real phenomenon. I hold then the ends of the chain, muscular sensations within me, the sensible qualities without me, and neither in the one case nor in the other do I see movement, if there be movement as mere relation: it is an absolute."[10] If we hypostasize this inner sensation of movement, we have the very stuff of reality, the *élan vital.*

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[5] The influence of the scientific concepts of Galileo, Descartes, and others upon Spinoza is frequently overlooked in an interpretation of what Spinoza means by Substance. His indebtedness to the physical theories of Descartes, his identification of Nature, God, and Substance, his definition of virtue as power, his insistence that the essence of an individual is the endeavor to persist in being, and his union of the will and the intellect, would seem to indicate that Substance is an infinite power and an infinite efficacy in which is implicit all of its concrete explications. The following references will bear upon this interpretation: *Ethics,* Part I, Propp. 24, 29 and note, 34, 35, 36; Part II, note to Prop. 3, and Lemma vii; Part III, Propp. 1 to 5; Letter xv of the Bohn Edition, and Chapter II of God, Nature, and Man.

[6] *Works* (Bohn Edition), Letter xxix.

[7] *Matter and Memory* (Paul and Palmer), p. 254.
[8] *Ibid.*, p. 255.
[9] *Ibid.*, pp. 256-257.
[10] *Ibid.*, p. 258.

For Bergson then, as well as for Spinoza, reality is activity. For both it is movement, unlimited power, and efficacy. Spinoza designates it as ***natura naturans.*** Bergson calls it vital impulse, *élan vital,* a center "from which worlds shoot out like rockets in a fireworks' display....a continuity of shooting out."[11] There is this difference in Bergson and Spinoza, however: Spinoza insists that anthropomorphic characteristics are not to be ascribed to Substance. This ascription is, however, precisely Bergson's metaphysical ultimate. The *élan vital,* he tells us, is primarily psychological; it is the essence we know in the innermost consciousness of each of us.[12] Spinoza declares that substance is manifested equally through the attributes of extension and thought; but for Bergson thought is the fundamental revealer. Barring this difference, however, the spirituality and materiality of Bergson, his vital and material orders, are the same as Spinoza's attributes of extension and thought. For Spinoza these attributes are two aspects of one and the same thing; for Bergson the difference between mind and body, matter and intellect, is but a degree in tension, a rate of vibration: "Physics is psychics inverted."[13] In our experiences of tension and relaxation, of effort and passivity, we pass by way of inversion from the one process to the other, from spirituality to materiality. Thus neither sensation nor divisible extension is real, but reality is intermediate between each. Reality is neither pure quantity nor pure quality; it partakes of the nature of each; it is "concrete movement, capable like consciousness of prolonging its past into the present, capable, by repeating itself, of engendering sensible qualities."[14]

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[11] *Creative Evolution,* p. 248.

[12] *Ibid.,* p. 299.

[13] *Ibid.,* p. 202.

[14] *Matter and Memory,* p. 329.

Not only do we find a similarity between *natura naturans* and the *élan vital,* but if we pass to *natura naturata* and compare the description which the two philosophers give to an individual thing, we shall again find an agreement. We have seen that Spinoza insists that Substance is indivisible; that only in Imaginative knowledge is the continuum of matter apparently divided into discrete objects. Bergson likewise makes emphatic the observation that objects as we deal with them in our practical life are artificial divisions of reality. Both science and intuition, says Bergson, endeavor to "rediscover the natural articulations of a universe we have carved artificially."[15] The living body is a material zone, a center of activity in the totality of movement, and from this totality it cuts out objects, which are outlines of its eventual action. Our needs are so many search-lights "which, directed upon the continuity of sensible qualities, single out in it distinct bodies."[16] Thus, again, for both Bergson and Spinoza the individual thing is an abstraction from a context, a partial representation of reality. And just as Spinoza insists that the individual so conceived retains its inner character unaltered, so Bergson describes the vital impetus as active in each of its cognitively created parts. The *élan vital* is "an original impetus of life passing from one generation of germs through the developed organisms which bridge the interval between the generations."[17] This explains the resemblance we find along distinct lines of evolution, such as that between the structure of the eye of the pecten and that of the vertebrate, although each separated from its parent stock before the appearance of the complex eye. In each there has become explicit what was implicit in the original impulses. Species and individual, each is a manifestation of the unwinding of an internal activity.

[15] *Creative Evolution,* p. 260.

[16] *Matter and Memory,* p. 262.

[17] *Creative Evolution,* p. 87.

When we pass to Bergson's and Spinoza's criticism of knowledge and to an examination of their methods for the attainment of knowledge we again find an essential agreement. The differences, bar sentiment and background, are verbal. Bergson speaks out of a rich hinterland of data from biology and physics and his terms are those of modern psychology. Spinoza, unhappily, beclouds his philosophy for the present-day student with his scholastic terminology and his geometrical method of proof. Both, however, offer identical criticisms of certain modes of knowing. I wish first to contrast their criticisms of practical knowledge.

Each philosopher, we have seen, agrees that in our practical activity we do not properly grasp reality or truth. Spinoza designates practical knowing, knowledge of the Imagination. In the Imagination the mind "has not an adequate but only a confused and fragmentary knowledge of itself, of its own body, and of external bodies."[18] It is in Imaginative knowledge, however, that men form general or universal ideas. The individual acquires these as a result of what he learns from others or from his personal experience with individual objects. These various images run together, and as both diverse and essential elements of specific individualities experienced drop out, a general idea forms itself. But, manifestly, the general idea of horse does not express what a living horse really is. It retains only that which is common in one's numerous experiences with living horses, and that which is relative to one's own needs and purposes.[19] Spinoza, therefore, follows the nominalists, and condemns the general idea as inadequate and relative.

Similarly Bergson, in his criticism of conceptual knowledge, in the *Introduction to Metaphysics*. What Spinoza terms Imaginative knowledge Bergson there designates conceptual or symbolic knowledge. There are, he holds, two ways of knowing: the relative and the absolute. Conceptual knowledge is relative. The concept contains only that part of the object which is common to it and to others, and any combination of concepts must needs give only an artificial reconstruction of an object. The concept, further, involves a danger in that it generalizes at the same time it abstracts. The extension given it deforms the property essential to it.[20] "Thus the different concepts that we form of the properties of a thing inscribe around it so many circles, each much too large and none of them fitting it exactly."[21] This method serves the purposes of practical life since the function of the intellect is to promote utilities. When a concept is fitted upon a thing it labels the thing and suggests to us in precise terms the kind of action to be directed toward the object. But this knowledge is not scientific, nor is it sufficient for metaphysics. Metaphysics must possess absolute knowledge.

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[18] *Ethics*, Part II, Prop. 29.

[19] *Ibid.*, Part II, Prop. 40, note 1.

It is in this essay we find Bergson's most complete discussion of the method of absolute knowledge, intuition, which resembles what Spinoza speaks of interchangeably as *intuition* or the *intellectual love of God.* To know an object, says Bergson, we must identify ourselves with it. Absolute knowledge is given by intuition. "By intuition is meant the kind of *intellectual sympathy* by which one places oneself within an object in order to coincide with what is unique in it and consequently inexpressible."[22] Conceptual knowledge is not to be discarded, but is to be kept subsidiary and introductory to intuition. Just as Spinoza bases his intellectual love of God upon scientific knowledge, so Bergson emphasizes science must precede intuition. "On the one hand it will utilize the mechanism of intelligence itself to show how intellectual moulds cease to be strictly applicable; and on the other hand, by its own work, it will suggest to us the vague feeling, if nothing more, of what must take the place of intellectual moulds."[23] This intuition establishes a sympathetic relationship between us and the rest of reality; "by the expansion of our consciousness which it brings about it introduces us into life's own domain, which is reciprocal interpenetration, endlessly continued creation."[24]

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[20] *Introduction to Metaphysics* (trans. by T. E. Hulme), p. 19.

[21] *Ibid.*

[22] *Ibid.*, p. 7.

Spinoza evidently has something similar in mind when he speaks of intuition, or the intellectual love of God. For Spinoza too, science must precede and make possible intuition. Thus it is that inadequate ideas become adequate. For Spinoza also the mind through intuition becomes one with God, without losing its identity in God. To participate in the intellectual love of God is not to be isolated, but rather is to become attached to the totality of being from within. God then thinks in us and through us. Intuitive knowledge envelops time and space. Through intuition the individual mind erases all distinctions of time between the becoming, the after and the now; in it the different become the same, the successive simultaneous, the many one.[25] Grasped in this eternal aspect particular things are seen to be the interpenetration of forces, the explication of what is eternally implicit in God. In this intellectual love of God Spinoza attains to a sympathetic union with reality similar to that which Bergson acquires by means of his intuition. And in so far as one possesses this conscious intuition of all the spatial and temporal relationships of existence, he is, to quote Spinoza, "scarcely at all disturbed in spirit, but being conscious of himself, and of God, and of things by a certain eternal necessity, never ceases to be but always possesses true acquiescence of his spirit."[26]

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[23] *Creative Evolution*, pp. 177-178.

[24] *Ibid.*, p. 178.

[25] Cf. H. M. Kallen, *William James and Henri Bergson*, p. 110. In this book Mr. Kallen suggests the relation between Bergson and Spinoza which I have attempted to work out in greater detail. In addition to the similarity I have indicated in this paper it is possible to show an essential agreement between Bergson's freedom and Spinoza's necessity; and also between their theories of the mind-body relation.

It is evident then that in their outlines of a method for attaining a knowledge of reality as well as in their conceptions of the nature of reality there is a fundamental agreement between Bergson and Spinoza. We have found that for Spinoza the attributes of reality, as man conceives it, are thought and extension, and reality is infinite cogitation and infinite physical agency. For Bergson reality is creative action, it is a movement, and it is "the same inversion of the same movement which creates at once the intellectuality of mind and the materiality of things."[27] We have found that each condemns "practical knowledge" for purposes of philosophy, and that each appeals to a mystical experience which while based upon scientific knowledge transcends analysis and identifies the individual with the undivided flux, with the flow of an eternal becoming reality, *élan vital* or *natura naturans,* which both call God.

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[26] *Ethics,* Part V, Prop. 42, note.

[27] *Creative Evolution,* p. 206.

PARACELSUS AS A CHEMIST AND REFORMER OF CHEMISTRY.

PARACELSUS (1493-1541) was in youth and early manhood a student of the chemical processes and theories prevalent in his time—particularly experienced in the operations of mining and metallurgy of the region in which his early life was spent. To this experience he evidently added by study of the principal authorities upon alchemical knowledge of the time—as references or allusions to them are to be found in his own writings.

The chemists of the period were of two classes—artisans employed in the mines or the working of metals, in pottery, glass, dyeing or similar industries, or mystics striving by obscure and occult means to transmute the baser metals into gold or silver, or to discover the elixir that should prolong life or endow its possessor with perennial youth.

The practical chemists or the artisans in chemical industry were in the early decades of book-printing not addicted to publishing. Their trade recipes and manuals doubtless were in use in the form of manuscripts for their own use but not usually issued for public information. The important pioneer authors in technical chemistry, Biringuccio, George Agricola, Bernard Palissy, were also of the period of Paracelsus, though their works important to the history of chemical science did not appear until after the death of Paracelsus.

The principal chemical authorities extant during his life were the early Greek philosophers—of whom Pliny was the most important compiler, and the works written by or attributed to—for many were apocryphal—the Arabians Gheber and Avicenna, the Italian (?) Arnaldus de Villanova, the German Albertus Magnus, the Englishman Roger Bacon, and the Spaniard Raimundus Lullus (or Lully).

In so far as the chemical knowledge contained in these writers is concerned it appears from the studies of M. Berthelot, that they contained very little not known to Egyptian or Greek writers of the early centuries of our era. The metaphysical philosophy and mysticism of later Greek and Egyptian chemistry had however from Chaldean, Arabian and other Oriental sources been added to and elaborated to such a degree that the chemical writings of the above authors or those written under their names were fantastic, obscure, and often intentionally incomprehensible.

It is evident from the writings of Paracelsus that he was familiar with the chemical processes in use in the mines and metallurgical laboratories of the country in which he lived. His knowledge of the chemistry of his time was extensive and well assimilated. It is also evident that he was familiar with and influenced by the often fantastic speculative theories of Lullus, Arnaldus de Villanova and others respecting the nature of matter and the origins of metals.

Paracelsus wrote no treatises devoted exclusively to chemistry or alchemy. The few which appeared under his name and which answer such description, were forgeries —as judged both by internal evidence and by the evidence of Huser, who, while including them in his collection because they had been so published, characterized them as apocryphal.

Nevertheless in his other writings upon medicine, surgery, or natural philosophy, he includes much chemistry, particularly in the books entitled *De mineralibus, De natura rerum, Archidoxa.* In this unsystematically arranged and scattered material are recorded many facts not found in earlier writings, and operations more clearly described than previously. One historically important theory, that of the three elements (*tria prima*)—sulphur, mercury, and salt—as constituting principles of all other substances, seems to have been original with him, though using earlier speculations as material for its development.

Historians of chemistry have generally recognized the important influence of Paracelsus upon the development of chemical science in emphasizing its importance to medicine and pharmacology.

Strangely enough, however, it was just in relation to this, his most certain influence upon the development of natural science that his reputation for knowledge, originality, and indeed for honesty, was called in question for more than two centuries. The occasion for this was the appearance of some clever literary forgeries which appeared to place Paracelsus in the position of a plagiarist and to deprive him of his claim as the initiator of the era of chemical medicine. Huser's collection of the philosophical and medical works of Paracelsus, which included to be sure much of doubtful or spurious origin, appeared in 1589-1591.

About ten years later there began to appear a series of treatises by an alleged Benedictine monk—Basilius Valentinus. The publisher of these or at least of the earlier ones was a certain Johann Thölde. Thölde claimed to have discovered and translated into German the Latin manuscript. These works, especially the "Triumphal Chariot of Antimony," attracted immediate and wide-spread attention because of their real chemical importance at the time. The work mentioned was a real contribution to the chemistry of antimony compounds. The inference from the text was that they were written early in the fifteenth century, therefore a century before Paracelsus.

As the appearance of this work occurred during the period of greatest popularity of the works of Paracelsus, it was soon noticed that there was a remarkable similarity both in matter and form of presentation between much contained in Basil Valentine and in Paracelsus. Like Paracelsus, Basil Valentine had abused the physicians and their authorities,—the mineral remedies practised by Paracelsus were here also advocated. Even the three primary principles, sulphur, mercury, salt, were found in Basil Valentine. The chemical facts were often more clearly described than in Paracelsus. In short, it was evident to critical minds that a plagiarism existed. To be sure, no previous writer had ever mentioned or quoted a Basil Valentine. Nor in fact were the alleged original manuscripts placed in evidence. Paracelsus, if he were the plagiarist, must then have had a monopoly in his access to the works of Basilius. There were indeed writers of the period who expressed disbelief in the authenticity of the find. Generally, however, these came to be accepted as genuine.

From certain passages in the writings it however became evident that they could not have been written as early in the fifteenth century as alleged by the supposed author, for allusions to metal used in type-founding, and to the French disease, made it evident that their date could not be earlier than the end of the fifteenth century. Nevertheless it became quite generally accepted that there had existed a writer who wrote under the name of Basilius Valentinus (though no record of such a name could be found in the register of Benedictines), that he lived before Para-

It is by no means necessary to assume that all these new remedies he introduced were originated by him. Many of them were, though not authorized by the faculties, in use as popular remedies in certain localities at least, or used by irregular practitioners. Thus mercury preparations mixed with fats had been introduced for external use in certain treatments by Italian physicians previous to Paracelsus. It is nevertheless true that in the extension of the pharmacopœia to a great number of preparations requiring the operations and methods of chemistry for their preparation he exerted his greatest influence upon chemical activity and development. Not only mercury and antimony preparations but preparations of lead, arsenic, copper, and iron entered into his remedies. Opium also seems to have entered into his practice quite largely and the word laudanum seems to have originated with him—whether or no his "laudanum" was an opium preparation, as on that point the doctors disagree.

The name of zinc first appears in the writings of Paracelsus, though that he therefore first named it, is not to be inferred. It was probably at least locally in use in mining regions in which he had studied.

"For that is a metal which fire may subdue and which can be made into an instrument by man. Such namely are gold, silver, iron, copper, lead, tin. For these are generally known as metals. Now there are some metals which are not recognized in the writings of the ancient philosophers nor commonly recognized as such and yet are metals; as *Zincken* (zinc), *Kobaltet* (?), which may be hammered and forged in the fire."[8]

"There is also another metal called *Zincken*.... This is not generally known, it is in this sense a metal of a special kind and from another seed (i. e., origin). Yet many metals adulterate (alloy) with it. This metal is itself fusible for it is from three fusible elements (i. e., the three primary elements), but it has no malleability but only fusibility. And its color is different from the colors of others, so that it is not like the other metals as they grow. And it is such a metal that its *ultima materia* is not as yet known to me. For it is nearly as strange in its properties as quicksilver. It admits of no admixture and does not endure metallic manufacture, but stands by itself."[4]

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[8] Paracelsus, *Op. fol.* (Strassburg, 1616-18), II, 134, "De mineralibus."

Mercury (quicksilver), Paracelsus did not consider a true metal. Though of "metallic nature," it could not be hammered or cast, lacked malleability, but it is of metallic nature because "by chemical art it can be brought to malleability and fashioning" (doubtless meaning in its alloys or amalgams).

The first mention of bismuth is sometimes, though incorrectly, ascribed to Paracelsus, as it is mentioned by Agricola in his *Bermannus,* printed in 1530, and even by a still earlier anonymous writer.[5]

Another observation credited to Paracelsus is the distinction between "alums" and "vitriols" in ascribing to the former an earth as base, and to the latter a metal. This was for that time a logical discrimination, for it was Sir Humphrey Davy who first demonstrated that the so-called "earths" could be reduced to metals hitherto unknown. The term "reduction" (*reduciren*) as applied to the obtaining of metals from their ores is also said to have been first introduced into chemical literature by Paracelsus.

Many other processes not new are described by Paracelsus, and his descriptions are frequently straightforward and with none of the intentional mystification of the great bulk of alchemical writings of the time or of many even

[4] *Loc. cit.,* p. 137.

[5] Cf. Agricola, *De re metallica,* edited by Hoover, p. 433, footnote.

in the century following. That they are not always intelligible is true, but this is rather from the use of terms whose meaning is not now clear, or from careless and hasty writing or editing. The following is an illustration of his better style. It describes the preparation of white lead and vinegar and carbon dioxide gas.

"The mortification (from *mors*, death) of lead consists in converting it into *cerussa* which is also called white-lead (*Bleiweiss*). Its preparation is in two ways, one in medicine, the other in alchemy. Its preparation in medicine is thus—that you hang it (the lead) in thin sheets over a sharp wine-vinegar in a glazed pot. The pot is then well stoppered so that no spirits may volatilize and set in warm ashes, or in winter behind the stove: then you will find in ten to fourteen days good white lead adhering to the sheets, which you may remove with a hare's foot, and again hang the sheets, and do this until you have white-lead enough. The other preparation of white-lead—in alchemy—is like this except that in the vinegar much of the best and finest salmiac is dissolved. That gives a fine and subtle white-lead."[6]

By the first of the two methods mentioned the necessary carbon dioxide gas for the formation of the carbonate must come from the fermentation of the vinegar. This makes a slow process to be sure. In the second process, with the addition of the salmiac, the sal ammoniac as then prepared often consisted of or contained ammonium carbonate which with the acetic acid of the vinegar liberated carbon dioxide in greater quantity than from the fermentation of the vinegar alone. Similar descriptions of this process exist in ancient Greek and Roman writers, though without use of sal ammoniac.

With respect to his theoretical views of chemistry, we should naturally expect to find them fanciful and unscientific, and we are not disappointed. They are based upon the theories of his predecessors with such changes as commend themselves to his own preconceptions. Thus he does not deny the possibility of transmutation of the metals. But his practical sense rejects the search for it as a waste of valuable energy otherwise more profitably employed.

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[6] *Op. fol.*, I, 893-4, "De natura rerum."

"Many have said of alchemy that it is for making gold and silver. But here such is not the aim but to consider only what virtue and power may lie in medicines."[7]

"Not as they say—alchemy is to make gold, make silver: here the purpose is to make arcana and to direct them against diseases."[8]

From the point of view of the history of development of ideas in physical or chemical science it is interesting to find that our word *gas* which was first formulated by Van Helmont as a generalization to include the various elastic fluids which we now call by that name, finds its suggestion in Paracelsus.[9] Though suggested by Van Helmont the term gas was slow in making its way. It will be remembered that the celebrated work of Jos. Priestley in the eighteenth century bore the title of *Different Kinds of Air*. Van Helmont (1577-1644) who was strongly influenced by Paracelsus and one of his strong defenders, though differing from him in his views in many respects, tells us that he derives the word gas from the Greek *chaos*.[10] This term, however, is used repeatedly by Paracelsus as a generalized term for air, and certainly was familiar to so thorough a student of Paracelsus as Van Helmont manifestly was.

Thus Paracelsus says, "And they are born from the elements..... as for instance out of the element *terrae*

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[7] *Op. fol.*, I, 149, "Fragmenta medica."

[8] *Op. fol.*, I, 220, "Paragranum."

[9] See Strunz, *J. B. van Helmont* (1907), p. 30, and E. O. von Lippmann, *Chemiker-Zeitung*, XXXIV, p. 1.

[10] J. B. van Helmont, *Opera Omnia*, 1682, II, 132.

(earth) its species, and out of the element *aquae* (water) its species, out of the element *ignis* (fire) its species, out of the element *chaos* its species."[11]

"Thus all superfluous waters run into their element called the sea (*mare*); whatever is terrestrial (earthy) returns to its element called earth (*terrae*); what is igneous into the element fire (*ignis*); and what is aerial (*aereum*) that runs into its element *chaos*."[12]

"The elements in man remain indestructible. As they have come to him so they come from him. What he has received from the earth goes back to the earth and remains such so long as heaven and earth stand; what he has in him that is water that becomes water again, and no one can prevent it; his *chaos* goes again into the air (*Luft*), his fire to the heat of the sun."[13]

Thus "chaos" used by Paracelsus for air became "gas" to his disciple Van Helmont, though even in Van Helmont's time the real differences between gases were so little understood that the value of the generalized term was not appreciated at the time. It required another century of accumulated facts to make it necessary.

It would be interesting to know if Paracelsus really discriminated between air and the vapor of water, or other gases. The following passage is not conclusive, being capable of different interpretations. It is nevertheless of interest.

"When, from the element water, air (*Luft*) is to be separated, that takes place by boiling, and so soon as it boils, the air separates from the water and takes with it the lightest substance of the water, and in so much as the water is diminished so according to its proportion and quantity is the air also diminished."[14]

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[11] *Op. fol.*, I, 269, "Labyrinthus medicorum."

[12] *Op. fol.*, I, 291, "Das Buch von den tartarischen Krankheiten."

[13] *Chir. Bücher*, fol. 378, "Von offenen Schaden."

So strong an adherent as Paracelsus of the neo-Platonic notions of the interrelation of all things in the universe, would naturally be interested in the prevalent theories of the nature of matter and of its changes. That the causes which influence health and disease might be understood it was necessary that the nature of chemical changes, and the constitution of matter should be understood.

Hindu, Greek, Arab, and later philosophers had speculated upon the nature of matter with the result of the final crystallization in medieval philosophy of the theory of the four elements, fire, air, earth, and water. Upon this was founded the Galenic doctrine of the four humors in the human organism, and the theory had become in the medieval Aristotelianism petrified into infallible dogma.

Medieval alchemists had as the result of the study of metallurgical chemistry, of observations upon the occurrence of the metals in the earth and the changes to which they are subject, from time to time developed certain independent notions of the nature of matter. The strange properties of mercury and of its alloys with other metals, the occurrence of sulphur in many ores and its appearance or disappearance in the treatment of these ores, had given rise to speculations as to the possible relations of these substances to the growth or development of the metals in the earth. From such phenomena and from the peculiar properties of many alloys of the common metals arose doubtless the hopes of transmutation of base metals into purer or more precious metals.

Raimundus Lullus and other early alchemists had assumed therefore that mercury and sulphur were present in all metals. In the literature of the Middle Ages or early

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[14] *Op. fol.*, I, 791, "Archidoxa."

Renaissance the mercury or mercuries, and the sulphur or sulphurs were not the elements sulphur and mercury as we understand them but were supposed to be substances related to these elements and capable of influencing the colors, fusibility, behavior toward fire etc., of the metals of which they were constituent principles. There was no agreement among writers of the time however, as to the properties of these elementary substances, nor as to their role or function in the metals or their ores.

Upon this vague and variable foundation, this inheritance from the alchemists, Paracelsus constructed his more comprehensive and consistent theory of the three elements, sulphur, mercury, and salt, which was destined to become the most influential theory of the constitution of matter until gradually replaced by the phlogiston theory in the eighteenth century.

Paracelsus recognized the four Aristotelian elements or principles—earth, air, water, fire—but considered them also as consisting of the three primary elements (*tria prima*). To his three elements he assigned more definite and better characterized functions than had previously been recognized. Sulphur was the combustible principle in all substances, not merely in the metals; mercury that which imparted the property of liquidity, or fusibility, and volatility; and salt that which determined the non-volatility and incombustibility of substances.

"For all that fumes and disappears in vapors is mercury; all that burns and is consumed is sulphur; all that is ashes is also salt."[15]

These three constituents of all matter are not, however, to be understood as answering to the definition of elementary substances as at present accepted. Like the Aristotelian elements they also typified qualities or principles. Thus sulphur was not a substance of constant and invariable properties entering into the constitution of other substances, but varied with the substance which contained it. To use the words of Paracelsus—"For as many as there are kinds of fruits—so many kinds are there of sulphur, salt, and so many of mercury. A different sulphur in gold, another in silver, another in iron, another in lead, zinc, etc. Also a different one in sapphire, another in the emerald, another in ruby, chrysolites, amethysts, magnets, etc. Also another in stones, flint, salts, spring-waters (*fontibus*), etc. And not only so many kinds of sulphur but also so many kinds of salt,—different ones in metals, gems, etc.... And the same with mercuries, different ones in the metals, others in gems, and as many as there are species—so many mercuries. And yet they are only three things. Of one nature is sulphur, of one nature salt, of one nature mercury. And further they are still more divided, so that there is not only one kind of gold but many kinds of gold, —just as there is not only one kind of pear or apple but many kinds. Therefore there are just as many different kinds of sulphurs of gold, salts of gold, mercuries of gold."[10]

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[15] *Op. fol.*, I, 898.

We should therefore consider the three elementary principles of Paracelsus and his followers rather as generalizations of certain properties inherent in and common to matter, than as elements in the modern sense. The importance that this theory possessed for his time, was that it was more closely related to phenomena observed in chemical experimentation than the concept of the Aristotelian elements. Consequently it became the dominant hypothesis as to the nature of matter until in the seventeenth century the keen critical analysis of Robert Boyle laid bare its inadequacy and unscientific basis. Boyle indeed it was who quite ignored and that charcoal (i. e., fuel) remains cheap. As to this I will say that if the smith could work his metals without the use of fire, as these so-called physicians prepare their medicines without fire, there would be danger indeed that the charcoal-burners would all be ruined and compelled to flee.

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[10] *Op. fol.*, II, 132, "De mineralibus."

"But I praise the spagyric (chemical) physicians, for they do not consort with loafers or go about gorgeous in satins, silks and velvets, gold rings on their fingers, silver daggers hanging at their sides, and white gloves on their hands, but they tend their work at the fire patiently day and night. They do not go promenading, but seek their recreation in the laboratory, wear plain leathern dress and aprons of hide upon which to wipe their hands, thrust their fingers among the coals, into dirt and rubbish and not into golden rings. They are sooty and dirty like the smiths and charcoal-burners, and hence make little show, make not many words and gossip with their patients, do not highly praise their own remedies, for they well know that the work must praise the master, not the master his work. They well know that words and chatter do not help the sick nor cure them. Therefore they let such things alone and busy themselves with working with their fires and learning the steps of alchemy. These are distillation, solution, putrefaction, extraction, calcination, reverberation, sublimation, fixation, separation, reduction, coagulation, tinction, etc."[18] The type of chemical physician here alluded to existed among the surgeons of Strassburg, exemplified in Brunschwyg's *Liber Destillandi* (1500).[19]

This opening up of a new field of chemical activity which promised so much of importance in its development and which touched directly upon the field of the practice of medicine, the most important field of natural science at that period, and the appeals of Paracelsus to abandon the search for the transmutation of metals and other vain goals of the alchemists, met almost immediate response among those students who were interested in the study of nature—and there were many such—and it was indeed from the chemists that the most enthusiastic and productive followers of Paracelsus arose. A new and important impulse had been imparted to chemistry, so that in spite of the fact that no great chemical discoveries or generalizations can be attributed to Paracelsus he may yet with justice be called a reformer of chemistry.

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[18] *Op. fol.*, I, 906, "De natura rerum."

[19] See article by the present writer in *The Scientific Monthly*, February, 1918, p. 167.

It is interesting to contrast the work of Paracelsus with that of his great German contemporary, Georgius Agricola (Georg Bauer), 1494-1555. Agricola was also medically trained as well as being thoroughly versed in mining and metallurgy.

His descriptions of mining and of metallurgical and chemical facts and processes are systematic, orderly, and generally clear and comprehensive. His theory was based upon the prevalent Aristotelian ideas. His published work upon mining and metallurgy possesses more permanent interest from a scientific point of view than the writing of Paracelsus because he confined himself to the task of presenting the established facts and processes of his specialty in clear detailed description, so that it might be of use for others who should follow in the same line of work. Many chemical facts and processes are mentioned that appear also in Paracelsus, but as with Paracelsus, so with Agricola there is no pretension that these are original with the author. It is interesting to note that neither one of these two men—the most important of their century in chemistry—seems to have been aware of the existence of the other. Agricola in Saxony and Paracelsus in Switzerland and

Austria possessed many interests and much knowledge in common, but Agricola's great work appeared after the death of Paracelsus, while those works of Paracelsus which contain most of his chemistry did not appear in print until after the death of Agricola. It is therefore not surprising that neither knew of the other. Agricola's great work *De re metallica* remains a classic in technical chemistry, while Paracelsus has left little that is of permanent interest to chemical science. But the reform of chemistry was not the main aim of the efforts of Paracelsus, to him that was but subordinate to his great ambition, the revolution of medicine.

Yet the influence of Paracelsus upon chemistry was epoch-making. By pointing out a rational and promising field for chemical activity and by his own successful application of chemically prepared remedies he inaugurated a movement which has continued without interruption and with increasing importance to the present day.

From his time on a new vitality was infused into chemical thought and activity. Instead of the passive acceptance of ancient authorities and traditions, there began a struggle for progress through experiments and their interpretation, often indeed unscientific and illogical at first, but nevertheless only from such beginnings of independent thought and initiative was the scientific spirit to be developed.

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CRITICISMS AND DISCUSSIONS.

THE SON OF MAN.

The Galilean founders of Christianity (who were Jews by religion, although they may have been descendants of the Aryans deported by Tiglath-pileser IV to Galilee in 738 B. C.)[1] spoke Aramaic. *Talitha cumi* (Mark v. 41) and other phrases attributed to Jesus are Aramaic. The *Logia* (Q)[2] from which the sayings of Jesus in Matthew and Luke are derived were Aramaic.[3] *Bar-nâshâ,* son of man, is the common Aramaic expression for *man.* Similarly Heb. *ben-adám* denotes an individual of the *genus homo.* The Greek Bible renders it *υἱὸς τοῦ ἀνθρώπου,* the same expression which we find in the New Testament.

The original meaning of *bar-nâshâ* was not *filius hominis,* but *filius viri.* A person who is the *son of a man,* in contradistinction to an individual who is the *son of a nobody,* is a gentleman.[4] The great Irish Assyriologist Edward Hincks, who died in 1866, recognized long ago that the cuneiform phrase *mâr lâ mâman,* a son of a nobody, indicated a man of low origin.[5] Cicero used the expression *filius*

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[1] See my paper "The Aryan Ancestry of Jesus" in *The Open Court,* No. 635 (April, 1909), p. 199.

[2] See *The Open Court,* No. 653 (October, 1910), pp. 603, 618.

[3] See Wellhausen, *Einleitung in die drei ersten Evangelien,* second edition (Berlin, 1911), p. 78. On page 162 Wellhausen emphasizes the artistic and literary form of the *Logia.* Of Adolf Deissmann's view that the Sayings are on a par with the papyri scribbled by illiterates Wellhausen remarks, "It is hardly possible to make a more injudicious statement" (*Urteilsloseres kann kaum geäussert werden*). Cf. my remarks in the *Transactions of the Third International Congress for the History of Religions* (Oxford, 1908), Vol. 1, p. 303, n. 4.

[4] Cf. Gesenius's *Hebr. Handwörterbuch,* sixteenth edition (1915), p. 53b, line 2.

[5] See *Records of the Past,* Vol. 3, p. 46, n. 2 (London, 1874); E. Schrader, *Keilinschriftliche Bibliothek,* Vol. 1, p. 65, line 81 (Berlin, 1889); Delitzsch, *Assyr. Handwörterbuch* (Leipsic, 1896), p. 419b.

terrae which corresponds in some respects to the Heb. *'am ha-'árç*, unlearned.

In Hebrew, *bĕnê-'adám* = *filii hominis* means *homines*, and *bĕnê-'îsh* = *filii viri* denotes *gentlemen*. A Maccabean poet (c. 163 B. C.) calls the Hellenizing members of the Jerusalem aristocracy *bĕnê-'îsh*, lords. Luther renders this correctly in Psalm iv. 2 *Liebe Herren*, dear sirs, although the Latin Bible has *filii hominum*.[6] Our Authorized Version has *O ye sons of men*, nor has this mistranslation been corrected in the Revised Version. In Psalm xlix. 2 the Authorized Version translates Heb. *gam-bĕnê-'adám gam-bĕnê-'îsh* correctly *both low and high*. In Psalm lxii. 9 we find *Ak-hébl bĕnê-'adám, kazáb bĕnê-'îsh*, Men of low degree are but vanity, men of high degree an illusion. Heb. *kazáb* denotes originally a wady which dries up during the summer. The meaning *lie* is secondary, not *vice versa*.

In the Code of Hammurabi (c. 2100 B. C.) *mâr-amîli*, son of a man, is a *full-born* man, while *mushkînu*, which appears in Hebrew as *miskén*, and in French as *mesquin*, is a *free-born* man. *Mushkînu* is not a serf or bondman, but a plebeian or commoner, whereas *mâr-amîli* is a patrician or nobleman. In the Old Testament, *miskén* does not mean *poor*, impecunious, but *humble*, of low origin. The *poor and wise child* in Eccl. iv. 13 alludes to Alexander Balas,[7] who was a boy of humble origin, but a friend of the Jews. *Wise* is used for *godly*, religious, and *foolish* for *ungodly*, irreligious.[7] Assyr. *mushkînu* is connected with Arab. *kâna, yakînu*, and *istakâna*, to submit, to be humble.[8] Assyr. *amîlu* is derived from the stem of Heb. *'amál*, labor. For the preservation of the *a*-vowel after the initial *'Ain* we may compare *atûdu*, he-goat; *aqrabu*, scorpion; *adî*, until. *Amîlu* is a form like Heb. *asîr*, captive, or *nabî*, prophet; but *amîlu* does not mean *worked*, but *working*. The form *qatîl* may have the meaning of *qâtil*,[9] so that Assyr. *amîlu* may be equivalent to Arab. *'âmil*. Nor does *amîlu*, worker, denote a *laborer*, but an *employer of labor*, just as we say that a captain *works* a ship, or that a captain of industry *works* a number of mines. Two hundred years ago the term *manufacturer* was used in the sense of *workman.* In our terms *telegraph-operator* and *coal-operator* the word *operator* has two entirely different meanings. The Spanish *hacienda,* landed estate, manufacturing or other establishment in the country, is derived from the Lat. *facienda,* things to be done. In Scotland the manager of an estate is called *factor,* lit. *doer,* maker. This is also the original meaning of Assyr. *amîlu.*

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[6] I have explained Psalm iv in *The American Journal of Semitic Languages*, Vol. 26, p. 6.

[7] See Haupt, *Ecclesiastes* (Baltimore, 1905), p. 36, n. 9; *The Book of Micah* (Chicago, 1910), p. 53, n. ‡.

[8] See my paper on Psalm lxviii in *The American Journal of Semitic Languages*, Vol. 23, p. 226, n. 13.

[9] See W. Wright, *A Grammar of the Arabic Language*, third edition (Cambridge, 1896), Vol. 1, p. 186, B.

The definition of Assyr. *mâr-amîli,* son of a man, as *patrician* and *mushkînu* as *plebeian* was correctly given by the late Prof. R. F. Harper in his translation of the Code of Hammurabi;[10] but Winckler explained *mushkînu* as *freedman,*[11] Delitzsch as *bondman,* and Hommel as *monk* or *Levite.*[12] Harper rendered *amîlu* by *man* or *person,* and *mushkînu* by *freeman,* but he added (*op. cit.,* p. xii): In a few places it is almost necessary to translate *gentleman* as over against *freeman.* The Sumerian equivalent of *mushkînu* was *mashda.* Eduard Meyer in the third edition of the first volume of his *Geschichte des Altertums* (p. 578) regards *mâr-amîli* as a *free-born* man; but the *mushkînu* is a *free-born* man, and the *mâr-amîli* a *full-born* man or *gentleman.*[13] A man may be free-born without being well-born. The term *gentleman* may, of course, be used for *man* in general. One of my colored servants once told me that the colored gentleman of the man next door wanted to see me. Few of us realize that *Mr.* meant originally *master.*

On the other hand, *baron* meant originally no more than *man,* but gradually the word came to denote a *strong* or *powerful man,* and then a *magnate.* In Italian *barone* signifies not only *baron* and *husband* (cf. the English legal phrase *baron and feme* = husband and wife) but also *scoundrel,* vagabond, rascal. Assyr. *amîlu* and *mushkînu* may be compared to the ancient Irish *aires* who were of two classes, viz., the *flaiths,* who possessed ancestral land, and the *bo-aires* (i. e., *cow-aires*; cf. Lat *bos*) who possessed only cows and other chattels. Both classes were freemen, and the king was elected by them. The flaiths or lords kept slaves and had hamlets with laborers (cf. *Encyclopædia Britannica,* 11th edition, Vol. 3, p. 422b; Vol. 14, p. 768a).

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[10] R. F. Harper, *The Code of Hammurabi* (Chicago, 1904).

[11] Hugo Winckler, *Die Gesetze Hammurabis* (Leipsic, 1904).

[12] Fritz Hommel, *Grundriss der Geographie und Geschichte des Alten Orients* (Munich, 1904), p. 236.

[13] Also in Egyptian the phrase *the son of a man* denotes a *full-born man,* and in certain prophetic texts this term is used of a Messianic king; see Hugo Gressmann, *Altorientalische Texte und Bilder zum Alten Testament* (Tübingen, 1909), Vol. 1, p. 206, n. 1. I am indebted for this reference to Dr. Albright. For the ancient Egyptian prophetic texts cf. Eduard Meyer, *Geschichte des Altertums,* Vol. 1, third edition (Stuttgart, 1913), § 297.

The word *man* is used in German for the impersonal subject. Instead of *you say* or *one says* the Germans say: *man says.* Also *on* in French *on dit* represents the Latin *homo.* In 1 Sam. ix. 9 we read: *Formerly, when a man in Israel went to inquire of God, he would say, Come, let us go to the seer; for he that is now called a prophet, was formerly called a seer.* It might be well to add in this connection that the term for *prophet,* Heb. *nabî,* means originally *one who is caused to speak*; the verb *hinnabê,* to prophesy, is semi-passive.[14] The word for *seer,* on the other hand, denotes primarily a *scryer* or crystal-gazer.[15]

Our Authorized Version occasionally uses *man* in cases where the Hebrew has an impersonal phrase. In 2 Kings xxi. 13 our English Bible says: *I will stretch over Jerusalem the line of Samaria* [cf. 2 Sam. xvii. 13] *and the plummet of the House of Ahab, and I will wipe Jerusalem as a man wipeth a dish, wiping it and turning it upside down.* The original text has simply *as one wipes a dish,* but the rendering *as a man wipeth a dish* is said to have helped an American bride to induce her husband to assist her in washing the dishes. She had tried in vain to persuade him to help her; finally she said, even the Bible expected a man to wipe dishes, and her husband consented to do this work if she had any Scriptural authority for her demand. She called his attention to 2 Kings xxi. 13, and he submitted.

In the cuneiform proverb *Tallik tashshâ eqil nakri, illik ishshâ eqilka nakru,* Thou didst go and take the field of a stranger, the stranger came and took thy field,[16] the Sumerian original has *gish-gin-e mun-gur asha lu-kurâ-ge, ni-gin un-gur asha-zu lu-kura,* A man goes and takes the field of another, the other one goes and takes thy field.[17] We could also use the second or the first persons in this case. We could say: *If you go and take the field of somebody else, he may go and take your field*, or: *If I go and take the field of somebody else, he may go and take my field.* For *I try to do my best* we may say *One tries to do one's best* or *A man tries to do his best.* In vulgar parlance *fellow* is used for *man*: *Don't be hard on a fellow* means *Don't be hard on me.* The statement *A man cannot work at home if his wife insists on having the house full of guests* may be interpreted as a personal experience.

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[14] See my paper "The Religion of the Hebrew Prophets" in the *Transactions of the Third International Congress for the History of Religions* (Oxford, 1908), Vol. 1, p. 271.

[15] See my paper "Crystal-gazing in the Old Testament" in the *Journal of Biblical Literature,* Vol. 36, p. 88.

[16] This was correctly translated long ago by Sir Henry Rawlinson; contrast Jules Oppert, *Grande Inscription du Palais de Khorsabad* (Paris, 1863), p. 289.

[17] See my paper on the impersonal construction in Sumerian in Bezold's *Zeitschrift für Assyriologie,* Vol. 31.

In the same way we find *son of man*, the Aramaic term for *man*, used in the Gospel for the pronoun of the first person. In Matt.viii. 20 Jesus says: *The foxes have holes, and the birds of the air have nests, but the son of man has not where to lay his head.* Here *son of man* = *man* is equivalent to *I*. It does not denote the Messiah. It was subsequently interpreted in this way, probably on the basis of Matt. xxvi. 64 where the passage Dan. vii. 13 is alluded to, but this was not the original signification. We read in Matt. xxvi. 64: *Ye will see the son of man sitting at the right hand of power and coming on the clouds of heaven.* Also in Dan. vii. 13 we must read *on the clouds of heaven*, not *with*; the Septuagint has ἐπὶ τῶν νεφελῶν. Wellhausen states, Smend had called his attention to the fact that the man in the Danielic passage ascended to heaven on the clouds.[18] The reading *'al*, on, instead of *'im*, with, was suggested long ago by Nestle.[19] We must also follow the Septuagint in reading the perfect *ătâ* (= ἤρχετο) instead of the participle *âtê* (Θ, ἐρχόμενος). *Atâ-(hă)wâ* has the meaning of a pluperfect, *he had arrived* or *ascended.*

The phrase *kĕ-bar-nâshâ*, like a son of man, means *one looking like a man.* Some one might feel tempted to read *bĕ-bar-nâshâ* instead of *kĕ-bar-nâshâ*, and regard this *bĕ* as equivalent to the Arabic *bi* after the *ídhâ 'l-mufâja'ati*, the lo! of surprise.[20] For *behold, a man came forward*, you find in Arabic: *ídhâ bi-rájulin qad-áqbala.* In Hebrew, *ra'â*, to see, may be construed with *bĕ*. But *arû*, behold, occurs four times in the preceding verses of Daniel vii, and in none of these cases is it followed by *bĕ*. Apart from the introductory formula *ḥâzê hăwêth bĕ-ḥezwê lêlĕyâ*, I saw in the night-visions, the two verses Dan. vii. 13, 14 consist of six lines with 3 + 2 beats,[21] which may be translated as follows:

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[18] See Wellhausen's work cited above, in n. 3, p. 86; on p. 126 he renders again: *with* the clouds.

[19] E. Nestle, *Marginalien* (Tübingen, 1893), p. 40.

[20] According to Brockelmann's comparative syntax of the Semitic languages (Berlin, 1913), p. 36, the preposition *bi* after *ídhâ* means originally *at*, with.

13 And lo! on the clouds of heaven   had arrived one like a man;
He came to the Agèd Man,   and was brought before Him.
14 To him was given dominion,   and glory, and rule;
The peoples, nations, and races   should be subject to him;
His dominion is everlasting,   and will not pass away;
His rule is for all generations,[22]   and will not be destroyed.

The man whom Daniel in his vision saw ascending to heaven on a cloud does not represent the ideal and glorified people of Judea[23] or Michael, the guardian angel of the Jews, but the savior of Judea, Judas Maccabæus. The Book of Daniel was written about the beginning of the year 164 B. C. At that time Judas Maccabæus had defeated the Syrian armies under Apollonius, Seron, Ptolemy, Nicanor, Gorgias, Lysias.[24] Every nation told of the battles of Judas (1 Macc. iii. 26). The appearance of the hero is said to be *kĕ-bar-nâshâ,* like a man, because in his apotheosis he was transfigured. At the beginning of the Chaldean Flood tablet, Gilgamesh expresses his surprise that the appearance of his ancestor Hasis-atra, who had been translated to the gods, was unchanged.[25] He looked *kĕ-bar-nâshâ,* like a man.

Although *son of man* = *man* in this Danielic passage refers to the savior of the Jews, the use of this term in the Gospels for the Messiah is secondary.[26] In the Aramaic original of the *Logia* the phrase *bar-nâshâ,* son of man, simply meant *man,* but this could be used for *some one* and also for the first person.

The first Orientalist who took the term *filius hominis* in the sense of *homo* was the Archbishop of Aix, Gilbert Génébrard, who died in 1597. He referred for Matt. xii. 32 to 1 Sam. ii. 25. The passage in the Gospels is: *Whosoever speaks a word against the son of man* (i. e., *a man*) *may be forgiven, but whosoever speaks*

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[21] We may compare the anapestic pentameter in Browning's *Saul* and Sir Walter Scott's *Proud Maisie is in the wood, walking so early* or P. B. Shelley's *One word is too often profaned | for me to profane it.* See Haupt, *The Book of Micah* (Chicago, 1910), p. 22, n. 1, and p. 66, n. 4.

[22] For the restoration of this hemistich cf. Dan. iii. 33.

[23] See Wellhausen, *op. cit.,* p. 91 and p. 126, n. 1.

[24] Cf. Hastings' *Dictionary of the Bible,* Vol. 3, p. 182, iii.

[25] See my translation of the introductory lines of the cuneiform account of the Deluge in the *Journal of the American Oriental Society,* Vol. 25, p. 75; cf. Vol. 38, p. 61.

[26] Cf. Wellhausen, *op. cit.,* p. 128.

against the Holy Spirit, will not be forgiven.[27] The Old Testament parallel cited by Génébrard is: *If a man sin against another man, the gods may decide,*[28] *but if a man sin against Jahveh, who is to pray in aid of him?*[29]

Also the father of international law, Hugo Grotius, who died in 1645, maintained that the *son of man* in Matt. xii. 32 (*whosoever speaks a word against the son of man*) did not refer only to Christ, but to any man including Christ. He explained his view more fully in his annotation *ad* Matt. xii. 8, *The son of man is lord of the sabbath-day*, i. e., *man is above the sabbath.*[30]

Grotius's theory was elaborated by a German clergyman, Pastor Johann Adrian Bolten, of Altona, who died in 1805.[31] He said, if Jesus used the term *son of man* for the first person, it must be explained in the same way as the use of the German indefinite *man* instead of the first person.

Prof. Arnold Meyer, of the University of Zurich, emphasized Bolten's merits in his interesting little book *Jesu Muttersprache* (Freiburg i. B. and Leipsic, 1896). He said, however, that it was well-nigh ridiculous to explain the term *son of man* as equivalent to *some one* in apocalyptic passages like Matt. xxiv. 27 or xxvi. 64. The first passage reads: *As the lightning comes out of the east, and shines even unto the west, so shall also the coming of the son of man be.* The second verse is: *Ye will see the son of man sitting at the right hand of power, and coming on the clouds of heaven.*

We must remember, however, that the indefinite *some one* may be a veiled allusion to a very high personage. In Est. iv. 4 Mordecai tells Esther, *If thou refuse to intervene, help will come to the Jews from another place,* or *from another quarter,* i. e., from the Supreme Being, just as some one might say in Washington, The Secretary of State was in favor of it, but Somebody Else objected, alluding to the President. In my *Book of Esther* (Chicago, 1908), p. 41, I have quoted a number of passages from Anthony Hope's novel *Tristram of Blent*, e. g., *And if by a miracle the prime minister said yes, for all I know somebody else might say no. This dark*

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[27] Cf. Wellhausen, *op. cit.*, p. 66.

[28] We must read *u-fillĕlû* instead of *u-fillĕlô*.

[29] That is, become an advocate for him.

[30] Cf. Wellhausen, *op. cit.*, p. 129.

[31] Wellhausen (*op. cit.*, p. 34) points out that it was a German clergyman, C. G. Wilke, who showed nearly a hundred years ago (1826) that Matthew was based on Mark (cf. also *op. cit.*, pp. 109, 148, 154, 156).

reference to the Highest Quarter caused Southend to nod thoughtfully. In another passage we find: *There was now not only the very grave question whether the prime minister—to say nothing of Somebody Else—would entertain the idea.* A third passage reads: *The last words had presumably reference to the same quarter that Lady Evenswood had once described by the words "Somebody Else."* The personage alluded to is, of course, Queen Victoria.[32]

When the Pythagoreans said *αὐτὸς ἔφα, ipse dixit,* they did not show any disrespect for their master. The Arabic grammarians say that the indefinite *-mâ* is used with an intensifying force.[33] I believe, however, that this *-mâ* is not indefinite, but identical with the Assyrian emphatic *-ma* which appears in Hebrew as *-nâ.*[34] The Arabic grammarians also say that an indefinite cognate accusative is employed for strengthening or magnifying, e. g., *When the earth will be shaken with a shaking,* i. e., *shaken violently* (Arab. *ídhâ rújjati 'l-árdu rájjan*).[35] But the intensity depends here on the repetition, not on the indefiniteness. We use *some* now for *great,* splendid. Some years ago a Baltimore furniture dealer exhibited a fine bedstead with the laconic sign *Some Bed.*

The rationalistic theologian Professor Paulus, of Heidelberg, who died in 1851, pointed out that, if the original meaning of the phrase the *son of man* was simply *man,* the followers of Jesus combined this term with Dan. vii. 13 describing the coming of one *like a son of man* in the clouds of heaven, and regarded it as a designation of the Messiah. Paulus referred to Psalm lxxx. 17:

> Be Thine arm o'er the man at Thy right hand,[36]
> o'er the son of man Thou hast raised.

Here both *man* and *son of man* are supposed to denote the Jews at the beginning of the Maccabean period, but the Targum, says Paulus, refers the *son of man* to the Messiah.[37] However, it is not true that the Targum explains *son of man* in verse 17 (Heb. verse 18) as the Messiah; the Targum has *málkâ mĕshîḥâ* for *ben* in verse 15 (Heb. verse 16). Nor does *the man at the right hand* of JHVH and *the son of man whom He has raised* refer to the Jews; the man whom the poet has in mind is the savior of the Jews, Judas Maccabæus.

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[32] Dr. Ember has called my attention to the fact that the Egyptian indefinite pronoun *tw,* which corresponds to the German *man,* is often used as a respectful designation of the king; See Erman's *Aegyptische Grammatik,* third edition (Berlin, 1911), § 285.

[33] See Wright's Arabic grammar (cf. above, n. 9), Vol. 2, p. 276, B.

[34] See Haupt, *The Book of Esther* (Chicago, 1908), p. 49, 13.

[35] See Wright's Arabic grammar (cf. above, n. 9), Vol. 2, p. 55, A.

[36] We must read *lîmînéka*; cf Psalm cx. 1 and my translation of Zech. vi. 13 in the *Journal of Biblical Literature,* Vol. 32, p. 113; also the explanation of Psalm cx. 4 in my paper "The Coronation of Zerubbabel" in Vol. 38 of the same journal and my translation of Psalm cx in the *Journal of the Society of Oriental Research,* Vol. 2, p. 81 (Chicago, 1918).

[37] See Arnold Meyer, *Jesu Muttersprache* (1896), pp. 148, 159.

I cannot discuss all the passages containing the term *son of man*. Additional details may be found in Cheyne-Black's *Encyclopædia Biblica,* but Prof. Nathaniel Schmidt's excellent article on the "Son of Man" (*op. cit.,* cols. 4705-4740) should be supplemented by Wellhausen's remarks in § 13 of his introduction to the first three Gospels (1911).[38] Wellhausen says he agrees now with Eerdmans, of Leyden, and Lietzmann, of Jena, in denying that Jesus called Himself the *son of man.* This does not mean that Jesus did not use the phrase for the pronoun of the first person, but that He did not employ the term to designate Himself as the Messiah. In several passages we find *the son of man* where the parallels have the pronoun of the first person (e. g., Mark viii. 38; Luke ix. 26 and Matt. x. 33; also Luke vi. 22 and Matt. v. 11).[39] The passages in the Gospels in which the term *son of man* has an apocalyptic meaning represent later additions. In the oldest portions of the Gospels, which were originally Aramaic, *son of man* simply denoted *man* or *some one,* and this could be used in certain connections for the first person. But the original meaning of the term *son of man,* or rather *son of a man,* was gentleman.[40]

PAUL HAUPT.

BEHAVIORISM AND THE DEFINITION OF WORDS.

The propensity of philosophical studies to lead only to interminable arguments is one of the most striking features of the whole history of philosophy. Arguments are good, but only for the sake of conclusions; and unfortunately too many philosophical disputes lead to no results. The fact that so much discussion is rendered fruitless through lack of clearness in the definition of words, makes the study of language imperative. Before talking, take thought for the instruments of speech. This is as significant an injunction as the one that bids us inquire into our means of knowing before a stimulus and is *to* an object removed from the stimulus, except in rare and simple cases where stimulus and object coincide, as in the case of the protozoa. Specific response proper is made possible by the integration of reflexes, so that systems of connected reflexes function together, allowing recession of the stimulus from the object with reference to which the behavior is explainable. Professor Holt illustrates the situation very concretely by the case of a hypothetical two-eyed, two-finned water animal. Here stimulation of the right eye releases a response of the left fin, and stimulation of the left eye releases a response of the right fin. Thus light from a single source will cause the animal to approach it directly, for both eyes will be stimulated equally when the median line of the animal becomes directed toward the light. The behavior is then released by the immediate stimulation of the two eyes, but is a constant function of the distant light. Such a case is, of course, a very simple one. Human behavior is tremendously complex. But there has been some degree of continuity in evolution, and the essential principles of human behavior can be seen exemplified in the behavior of the simpler organisms.

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[38] Cf. *ibid.,* pp. 70, 74, 81, 85.

[39] Cf. Wellhausen, *op. cit.,* p. 130.

[40] Cf. above, n. 13, and *Journal of the American Oriental Society,* Vol. 37, p. 14.

Professor Holt would extend this theory of specific response to the highly developed language responses.[5] Words are symbols, lacking any intrinsic connection with their denotations. Thus the problem is to determine how words come to have a connection with their objects. According to Professor Holt's behavioristic scheme. a word is the stimulus that releases a response that is a function of the denotation of the word. It is organic response, consequently, that establishes the relation of reference of a word to its object. For example, the words, "Memorial Hall," for one to whom the words are in fact a sign of something, constitute the stimulus of a response that is a function of the Hall itself. An observer who had never heard of Memorial Hall, and to whom, consequently, the words were a sign of nothing, might discover the object of the sign by observing some one's behavior when the words were spoken—such behavior being an indexical interpretation of the words.

A word-sign, considered as a stimulus, differs from ordinary stimuli, since, being a symbol, it lacks any intrinsic connection with the object associated with it. It may seem circular to call a word a stimulus, and yet to say that the connection of a word with its denotation is constituted by organic response; for the definition of specific response seems to presuppose an original connection between

[5] See *The Freudian Wish*, p. 110.

the stimulus and the object of response. Professor Watson's view[6] is applicable here and solves the apparent difficulty. Professor Watson regards speech as a system of conditioned reflexes. That is, words become functional in habit systems so far as they become "substitutable for the stimulus which originally initiated an act."[7] A conditioned reflex may be established by repeatedly presenting two stimuli simultaneously, one being a stimulus that releases a response because of innate or at least previously acquired synaptical connections, while the other stimulus has at the start no connection with the response in question, or perhaps with any definite response at all. After a time the second stimulus alone will come to release the response that was originally released only by the first stimulus.

Thus through a process of habit formation words become substitute stimuli. There develops a correspondence between language and more overt behavior. "Words have grown up around motor acts and have no functional significance apart from their connection with motor acts."[8] Words probably first appeared in racial evolution through chance associations of sounds with overt behavior. They have come to be effective stimuli through association and substitution, being built up upon a basis of bodily habits. An external observer of behavior and of strange words cannot tell the denotation of the words until those individuals for whom the words have become substitute stimuli respond to the objects denoted by the words. Professor Watson exactly illustrates the view that specific response released by a word-stimulus is the indexical interpretant of the word, when he speaks of the case "where we hear a man tell us what acts he is going to perform on a horizontal bar and later see him executing those acts."[9]

As I have said above, we must keep in mind the distinction between a word regarded as a sign, which is a response relic, not behavior itself, and the *utterance* of a word. But, though the utterance of a word is actual behavior, it does not, however, guide us to the denotation of the word in cases where the word is unfamiliar. A further response, released by the word, is needed, and this response is an indexical interpretation of the word. The speech response, the utterance of a word or words, may be for the social purpose of calling another's attention to something, or of preparing a motor set in another person for something that is going to happen. For one who does not know the language in which the words are spoken, however, the vocal response does not indicate the objects referred to by the speaker, or prepare the desired motor set; but the foreigner can learn the denotation of the words by observing the behavior of others who possess the proper systems of habits so that the words are effective stimuli. Thus A says to B, who is about to leave the house, "It is raining." Thereupon B procures an umprella, and raises it as he goes out of the house. The complex of symbols or response relics, "It is raining," has thereby been interpreted for any stranger to the English language, who may be present, by B's response. B's response is an indexical interpretant of the words, and points out the denotation of the words. The words, "It is raining," or "It is going to rain," as relics of response, and mere symbols, are exactly on a level with the weather-bureau flag that is displayed when rain is expected. The weather-bureau flag has no intrinsic connection with rain. The connection that it comes to have with rain it acquires through usage, that is through specific responses released by it, which are an indexical interpretation of the sign. Many words are spoken or written for the purpose of calling attention, as, for example, "Railroad crossing; look out for the engine"; "Clear the way"; "Beware the dog"; etc. In all such cases it is obvious that, for one who had never seen or heard the words before, the symbols would denote nothing at all until they had been interpreted.

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[6] J. B. Watson, "Behavior and the Concept of Mental Disease," *Journal of Philosophy, Psychology, and Scientific Methods*, Vol. XIII (1916), pp. 589 et seqq. See also Watson, *Behavior*, pp. 328 et seqq., and H. C. Brown, "Language and the Associative Reflex," *Jour. of Philos.*, Vol. XIII, pp. 645-49.

[7] Watson, *loc. cit.*, (*Jour. of Philos.*), p.591.

[8] *Ibid.*, p. 591.

[9] *Ibid.*, p. 591.

The importance of such considerations in the case of definition is apparent. If by definition of a term we seek to tell what the term stands for, what it denotes, we see that the term intrinsically denotes nothing at all. To discover its acquired denotation we must observe the whole community of persons for whom the word is actually a sign. This community consists, with respect to the word in question, of indexical interpretants, and observation of such interpretants will disclose the denotation of the word. When we say that we must inquire of human usage to discover the definition of a word, we are recognizing that human usage is an indexical interpretant of the sign, and is the only guide to the denotation. If, on the other hand, we seek by definition to tell the *meaning*, as distinguished from the *denotation*, we must still seek for the denotation first as a guide to the meaning. A word refers at least to an objective situation in which its meaning may be sought in cases where there is no existent denotation.

The case of seeking the definition of a word is precisely analogous to the case of a stranger to a language seeking for the denotation of a word through observing the responses that it releases. In defining words one should stand outside the problem, with no preconceptions of one's own, and observe what the word-symbol is actually a sign of in human behavior. The definer can discover the class of objects to which the word refers by observing for what responses the word has become a stimulus, and then observing what class of objects such responses are a function of.

We may illustrate the part that human usage plays in establishing the meaning of words by referring to the original fixing of names to objects in the growth of language, speaking, for the sake of concreteness, in terms of an incident recorded in Hebrew mythology. When Adam confronted an animal kingdom of unnamed species, the cat became a cat when he called it a cat, and in like manner the dog became a dog. "Whatsoever Adam called every living creature, that was the name thereof." Adam did not create the animals, but he did create their names, and established the relations of reference that were involved. Adam did not *judge* that this animal was a cat, that, a dog; for there was no chance of his being in error. He created the symbols (the names of the animals) and arbitrarily determined what the symbols should denote. I have spoken figuratively, but for Adam substitute the whole human community; for the animal kingdom substitute the entire world of objects; and for the creation of language all at once at a definite time in history substitute a gradual evolution; and the same principle of convention, or usage, is seen to be involved. Though it has been recognized since the time of Aristotle that convention establishes the denotation and consequently the meaning of words, too little account is usually taken of convention by philosophers when the definition of words is in question. Though Aristotle pointed out that convention establishes the reference of words to their objects, it has remained for behaviorism to give a definite description of what convention means in this connection. It means simply that specific responses are indexical interpretants of word-symbols.

The subject of definition cannot be concluded without further reference to the difference between meaning and denotation. I have already distinguished these concepts. "The round square," for example, is a group of words possessing meaning, but no denotation, except for such a view as Meinong's—that there are objects of which it is true that they are not. The meaning of a word or descriptive phrase consists of a universal or of a complex of universals. Each constituent of the descriptive phrase, "the round square," for example, contains a universal, and the complex of universals constitutes the meaning of the phrase. Each constituent of the phrase also has a denotation, whether or not the phrase as a whole has one. The meaning is the connotation of the word, or the definition in intension, while the denotation is the definition in extension. If by definition proper we seek the meaning, or intension, of a word rather than the denotation, an inductive, empirical method of definition will consist in collecting instances of the objects which, by convention or common usage, the word denotes, and then in seeking in these cases for the universal element by virtue of which they are constituted a class. Specific response is a function of the class of objects that a word denotes, and is hence a guide to the solution of the problem of the meaning of the word.

It might be said in criticism, by pragmatists, for example, that such an account of meaning leaves out the dynamic aspect and the future reference involved in it. The dynamic factor is supplied, however, by the responding organism, and is not found in the stimulus itself. The meaning that attaches to a word-sign is not itself dynamic.

The way of procedure above indicated in seeking the meaning of words, that is, the observation of behavior that is centered around the words, and of responses released by the words—a procedure based upon a behavioristic theory of how words acquire meaning—is not unlike Dewey's view, for Dewey says,[10] "In the case of the meaning of words, we see readily that it is by making sounds and noting the results which follow, by listening to the sounds of others and watching the activities which accompany them, that a given sound finally becomes the stable bearer of a meaning."

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[10] John Dewey, *How We Think*, pp. 124 et seq.

EXISTENCE.

I am venturing to put forward for your consideration a few remarks on "Existence," because it appears to me that many questions of no little importance have been unduly complicated by too crude an idea of "existence."

In discussing different kinds of existence, it will be convenient first to discuss that kind of existence which is significantly predicable of what are called "sense-particulars." I will call this first kind of existence "primary existence." Primary existence is always implied in the naming of anything. Thus one cannot give a proper name to anything not having primary existence. But this kind of primary existence which can, I think, significantly be predicated of sense-particulars must be carefully distinguished from reality and non-reality, which are sometimes asserted of the same kind of thing. To call one's own sense-data real in waking life and unreal in dreams is not to be identified with asserting primary existence of some of one's sense-data, and not of others. All our sense-data have equally primary existence. Why we call some real and some unreal is because some give the usual kind of correlation with other sense-data, and some do not. Ghosts which cannot be touched are "unreal." Macbeth's dagger is "unreal" because the correlation with sense-data of touch which one has learned to expect, does not in fact occur in these cases. It may be, on the other hand, that the matter of correlation is merely unusual, as for example if one dreamt night after night of a certain object being at a certain place: i. e., if one's sense-data were correlated in a certain way. Then if one went to the place at which the sense-data ordinarily would have led one to expect to see certain sense-data correlated with the others in a particular way, one might not experience such a sense-datum. Again, if in what is called "waking life" one saw sense-data at different times which one could correlate by saying that they all belong to the sun, one would probably see certain sense-data as expected at other times; but if the sense-data had only been given in dreams, any reference of that kind would very probably be fallacious. Thus sense-data are said to be unreal when inferences usually true turn out to be false. Thus while it appears essential to predicate primary existence of all sense-data with which we are acquainted, sense-data can be said to be real or unreal in a definite sense.

The things which make up the outside world appear to be particulars and facts. Facts therefore have a kind of existence, which we will call "primary existence of facts," but which is not of the same kind as that for particulars: for the intrinsic nature of facts is different from the nature of particulars, and in view of their intrinsically different natures, the same property cannot significantly be predicated of both. As far as one can see, this apparatus of particulars and facts is adequate for the building up of empirical knowledge. Thus, we do not postulate existence of the primary kind to any other objects of our thought. We do not assume primary existence for physical objects and points and other non-experienced things.

Having considered briefly the crude data given empirically, we have to build up the other objects of thought by means of logical construction. It would perhaps be advisable to state shortly what appears to be the essence of this method. The problem for the solution of which this method is to be used is as follows. Certain things are given in experience—sense-particulars of various kinds and facts. We then wish to find other terms, such that in analyzing any proposition in which they occur, they themselves do not occur, but only the things which are given in experience. At the same time, these terms are to have certain definite properties. Then although a term α (say) appears in a proposition $\phi\alpha$ yet it will be possible to analyze $\phi\alpha$ into a proposition not containing α if α stand for a logical construction. In this way we shall be able to use propositions apparently containing α without in any way prejudging whether α is a thing having primary existence or not.

It is of extreme importance that we should be able to do this, for it has been held that in the proposition, e. g.,

"the round square does not exist"

what is asserted is that there is an entity which is round and square, and it has the property of not existing. This, however, is an unsatisfactory interpretation, and a better one can be given as Mr. Russell has shown, viz., "It is not the case that there is a thing both round and square." The "round square" appears to be a constituent of the original proposition and in the proposition some property seems to be predicated of this fictitious object. But with

Mr. Russell's theory of "incomplete symbols," the proposition is analyzed in such a way that the object disappears.

Another example may make the point clearer: the well-worn topic of points in geometry seems to provide a good illustration. We have given in experience sense-data of different sizes, but all these sense-data have some magnitude: one never directly apprehends a sense-datum which could be said to be a point, in the ordinarily understood geometrical sense of the word. Yet propositions apparently containing points occur: in fact by using points with entire and childlike trust the geometers have been able to predict the occurrence of sense-data with startling accuracy: the geometer is in the somewhat paradoxical position of deducing certain propositions apparently containing things like points from empirical data: and further his propositions, although expressed in the, empirically speaking, obscure terminology of points and instants, have the elegant property of being such that there is an interpretation in terms of sense-data which makes them verifiable. Thus, for instance, the physicist proves to his own satisfaction that an object will fall to the ground if not held up: this statement, it is interesting to observe, is in terms of things which appear to be entirely unknown in experience: one cannot, it would appear, directly apprehend a physical object. Further, it is very probable that one cannot verify the motion completely; for having certain physical limitations we cannot possibly "see the object" at every point of its path, unless space has an *extraordinary* degree of discreteness. However closely we look, it seems probable that we shall miss many intermediate positions—in fact, if space has even the mildest form of continuity, we shall always miss infinitely more positions than we shall see—and I use the word "infinitely" in a strict sense. But we shall find that if we look at a certain place at a certain time, we shall have the sensation called "seeing the object there." Thus the physicist formulates a system apparently based on empirical evidence, but which is expressed in obscure terms like instants, points, etc., which no one, I think, would venture to suggest are given in experience. The extraordinary success of physics in predicting occurrences of sense-data rather points to the fact that these unexperienceable things such as points and instants have at least a pragmatic function of providing a useful terminology. Now the method of logical constructions offers a solution of this paradox. If we can construct points (say) out of sense-data, we shall be able to understand how it is that they work in a science which is founded on empirical data. To a certain extent this has definitely been done by Mr. Russell and Professor Whitehead. It would appear that it is now possible to construct things which have the properties of points etc., and which are such that propositions in which they occur can be expressed entirely in terms of sense-data. It is only possible to get a discrete space out of sense-data actually experienced; but it is, of course, a mere prejudice that we should always imagine space to be continuous. It is a somewhat technical matter how exactly this can be done; but my point is that there is an important problem to be solved, and that this method appears to indicate a solution, and further, as I will now try to show, the whole point of the matter lies in the kind of existence which can be significantly predicated of points, instants, etc., on purely empirical grounds. William of Occam appears to have been a philosopher of some importance, but the most striking thing which is now coupled with his name is "Occam's razor"—and this wonderfully subtle methodological axiom, it is sad to find, is not really due to William of Occam at all. Occam's razor states that "entities are not to be multiplied without necessity." The extreme importance of this principle is generally maintained among logicians of a certain school and should, I think, be more universally recognized to be of fundamental importance. The essence of the principle lies in postulating primary existence of the fewest possible number of kinds of things necessary to explain the facts: then the method of logical constructions will allow us apparently to use entities in propositions without in advance giving them primary existence. The essential point about these logical constructions is that propositions in which they occur can be made to dissolve again into their constituent elements, all of which have primary existence. Thus, for example, suppose one says two straight lines cannot enclose a space, one does not immediately assume primary existence for lines etc., for lines of the most common and conventional geometrical variety having no thickness are not given in ordinary experience. Rather we look around for what is given, and logically construct them from these data. We are given sense-data of varying sizes, and by taking classes of these data all enclosing some of the others, we can with some elegant manipulations logically construct a point; i. e., we can find classes of sense-data which have all the properties which geometry requires of points. Then with the help of some ideas of order which are given in experience, one can get a line, and so on. In this way we *construct* a line. But its existence is not the kind of existence possessed by the sense-data out of which it is constructed. It is of such an ephemeral nature that if one looks closely at propositions in which it occurs, it will disappear and only sense-data will be left. It does not belong to the world of sensation: it cannot be touched or seen. It is not verifiable in sense and has the same kind of existence as the fairies of our childhood, which disappeared when we turned round to look at them more closely. Of course it would be just as great an error of logical taste to assert dogmatically that points etc., have not got primary existences, as to assert dogmatically that they have: it would in fact be a logical mistake fundamentally of the same kind. Occam's razor does not advocate that. One leaves open the possibility of points and non-experienced things having primary experience: but just as it is an error of logical style to assert the existence of things unnecessarily, so it is an error not to draw all the implications of the given data. That is to say: one does not assert the existence of points, as there does not seem to be any necessity for such an assertion for a satisfactory explanation of the given proposition: next, of course, one does not assert the non-existence of these things, but further one would assert that the given material is insufficient for such an assertion, and that therefore those who make such an assertion either have some private channel of knowledge, to which we have not got access, or are making the assertion on insufficient grounds.

In these few remarks I have tried to show that the question of "existence" is intimately connected with the logical treatment of epistemological questions of no little importance: that is my excuse for attacking the question. It appears to me not unlikely that a less crude idea of existence will give greater scope in the kinds of terms that one can use in propositions; and further more particularly that Mr. Russell's brilliant method of logical constructions, and its bearing on the existence of terms involved in propositions, at least indicates the direction in which the solutions of many epistemological questions of fundamental importance may be considerably advanced.

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THE RELATION OF LOGIC TO MATHEMATICS.

A survey of the growth of the kindred sciences, logic and mathematics, leads inevitably to the conclusion that the two are inseparably connected. Exact thought seems to contain an inherent dialectic, of such character that mathematics without logic is formless, —and logic without mathematics is empty. The historical beginning of mathematics in the days of Ahmes, the pebbles in the sand, and the abacus, shows that it arose essentially from practical needs; its problems and symbols in this primitive stage must be regarded as essentially relevant to physical acts and objects. Arithmetic and geometry on this level of culture, form necessary means of adjustment to concrete phenomena and are as independent of human volition as any thing could well be. However, we find conflicts constantly cropping up; the budding science is unhandy and cumbersome in its very lack of coherency, and from practical reasons, we find a demand that mathematics be reduced to a coordinated whole.

As a result order and system gradually replace the heterogeneous complex of practical problems, and we come to the development of the Euclidean system, based upon axioms which are justified by their self-evidence. The close intimate connection with the physical world-order fades into obscurity; the lines and figures of geometry are not bodies or parts of bodies but independent mental constructions. Finally the Kantian criticism expounds the view that the axioms are true, not because they apply to the external and independent world-order, but because they are *necessarily* bound up with our forms of thought, because we can think in no other way without contradiction. Whereas at first human choice had nothing to do with mathematics because of the hard, unyielding character of physical fact, under the critical view, it is summarily dismissed because of our total inability to alter the make-up of our understanding.

The discovery of non-Euclidean geometry has gradually created a revolution in this point of view. It is seen with ever-increasing clearness that a decision of the will is involved in the establishment of each set of axioms, and that choices are involved which no future experiment can condemn or justify. For example the amount by which the angle-sum of a triangle differs from two right angles may be so small as to baffle any observation, and it is thus entirely possible that we are dwellers of a non-Euclidean world. From a study of the objective and independent, mathematics thus becomes more and more concerned with a subjective element of arbitrary choice. Self-evidence disappears as a criterion, and is given its death-blow by Weierstrass in his brilliant example of a continuous curve which does not have a tangent.

Freed in this way, a fact which is at once a privilege and a restraint, mathematics develops in a double direction toward rigor and formalism. The growth of rigor may seem opposed to the increase of choice and independence of physical fact, but in reality the two are closely connected. Just as discipline is more easily effected in an organized army than among a hundred disconnected bands of outlaws, so, as mathematics becomes gradually reduced to a single rigorous system, it becomes increasingly submissive to human will, and develops a plasticity seemingly far removed from the condition of the hard, unyielding physical fact. From the time of Weierstrass, the tendency has been very strong to unify mathematics in terms of dependence upon the natural number system of positive integers. Any set of axioms defining a special part of the science is regarded as dependent in some way upon this natural number system in regard to consistency, categoricity and mutual independence. In this way the remote parts and latest developments of mathematics are elevated to the level of the elementary positive integers, gaining in certainty with the progress of rigor.

Combined with this, we have the counter-movement toward formalism, which brings with it the growing realization of the importance of the subjective element of choice. The principle of the so-called "permanence of forms," which accounts in a rather romantic way for the introduction of irrational, ideal, and imaginary numbers by attributing it to a demand which the mathematician makes upon experience, the study of groups as they appear in the different fields of order, the emphasis on the arbitrary and relative character of the indefinables,—all these lead to confidence in the power of mathematical creation and the adoption of the point of view that the positive integers are only a particular illustration of a peculiar kind of mathematical type of order, of which there are many other representations. Here we have commendable harmony and synthesis in mathematics, but it is not gained without cost. We must remember that if the remote parts of mathematics are just as certain as the system of positive integers, by the very identical reasoning it follows that these same positive integers are no more certain than the remote parts of mathematics.

More than this, just as each part of mathematics depends upon its own postulates and indefinables, so does the natural number system in its turn. The doctrine of formalism tells us that a term is indefinable and a proposition postulated only in reference to a particular system of axioms and terms, in another system we have the terms defined and the propositions proved. Because of this relativity we may well inquire as to the essential nature of this number system upon which mathematics is supposed to depend. Is it itself something plastic, responsive to our demands, or is it objective and independent? The formalist is forced to admit that an infinity of different sets of axioms for the positive integers are possible. Why should we use any particular one of these rather than another? If no single one is to be preferred, and the essence of arithmetic lies in the theorems, and not in the postulates and indefinables, then our choice seems to have nothing to do with the matter. Confronted with this situation, the formalist is forced to an extreme position and enunciates the theory of *nominalism,*—that numbers, and, in fact, mathematical entities in general, are nothing more than mere words; that they are not real as physical objects are real, but are free creations of the spirit with no necessary connection with objective existence. Not use, interpretation, or application is the goal of mathematics, but consistency, alone; and apart from the requirements of consistency, all limitations are to be cast aside as fetters on the intellect.

This radical nominalism is, it should be noted, in distinct and admitted opposition to the original character of the science as it developed from the study of the hard and fast physical problem. The only law which is now recognized is the law of logical consistency, and the mathematician believes himself to have attained his goal of independence and freedom. Yet wherein can he boast of freedom? Divorced from restraint and reality, he seems to be reduced to contemplation and admiration of his own mental processes, and submissive to self-imposed rules alone. As Brunschvig aptly remarks, "Mathematics has lost its claim to be a science, for science at least pretends to truth."

The temporary success of this impulse toward freedom is not without corresponding reaction. We see Frege indignant against the possibility of the subjective and arguing that the mathematician creates just as little as the geographer, that he can only describe what is *there*; Royce comparing the search of the arithmeticians for primes to the labors of the astronomers and impressed with the obstinate character of mathematical material. Indeed self-imposed fetters are often the most unyielding of bonds; witness the extremities to which a man will go for the sake of his honor, to which no external necessity could drive him.

Frege's attack upon this distasteful situation is at its most vulnerable point. If the mathematician is submissive to logic alone, that does not mean that the non-logical part of mathematics is subject to individual caprice, but that it does not exist. *Mathematics is objective and non-plastic because it is a part of logic.* Because the axioms of arithmetic can be proved from those of logic and the indefinables defined in logical terms, arithmetic and the whole of analysis has the certainty and consistency of logic itself. In this haven of rest Frege and Russell at first feel themselves completely satisfied.

But not for long. The inherent march of the dialectic is not to be halted. The supposedly safe ground of logic turns out to be a quicksand of contradictions, for the very reduction of mathematics to logical form has necessitated the employment of the notion of the class in such a way that from this and kindred notions there arise a veritable plague of paradoxes and contradictions. Mathematics may have all the certainty of logic, but these specimens of logic seem to be infected with an uncertainty far worse than any one had ever suspected to be present in the exact sciences.

Russell's remedy is swift and drastic. Logic is to be so changed that the paradoxes are avoided. The indefinables and primitive propositions, consequently, may be destitute of self-evidence (the axiom of reducibility, for example, of which one can only say at best that it has "every chance of being true"),—but that is a triviality compared with the victory over the paradoxes. However, when we find in the *Principia*: "Some propositions must be assumed without proof, since all inference proceeds from propositions previously asserted.... These, like the primitive ideas, are to some extent a matter of arbitrary choice," we may be pardoned for concluding that the work has not attained its goal, and that the hoped-for objectivity has not been reached. In fact, instead of an over-individual independent logic we have the logic of Russell and the logic of Frege and the logic of McColl and the "new logic" of Mercier and the anti-logic of Schiller, so that in making logic the master we allow caprice to play a more important part than ever even "mathematical creation" played in mathematics.

But this is impossible, it may be contended. Russell and Frege may err in details but logic itself is serene and independent. It is the articulate expression of *the way men ought to reason.* Just so long as this contention remains in its pristine vagueness, is the adherent of such a theory safe from attack;—but let him descend from his abstractions and formulate a particular code, that *thus* and *so* is the way men ought to reason, and he will be objected to from all sides. The proponent of the code is unable to justify his concrete propositions except by reiteration of their self-evidence and his own personal convictions; he is prevented from appealing to the verdict of experience by very definition, since in no way can we derive what ought to be from what is, or has been. That "the way men ought to reason" gives logic an *ideal* is not to be seriously objected to, but this tells us no more than to be logical is to be logical.

From this we may turn to the opposite extreme, from the empty abstraction to the concrete event; from such a view-point logic is independent of human volition because it is the formal expression of the way men *do* reason. But this is a theory which is even less tenable than the preceding, for no one can deny that men reason illogically. That whatever is concluded, is logically concluded is no more to be accepted than the equally radical ethical doctrine, that whatever is, is right.

We are confronted with a situation that is far from promising. Mathematics is reduced to arithmetic and arithmetic in great part at least, to logic: but logic is so far from being independent of the will, as the mathematician would have it, that it seems to be neither the way men ought to reason nor the way men do reason, but something as yet entirely indeterminate. The mathematician is in an intolerable situation. He has gained freedom, it is true, but a freedom which is worse than the dependence of the physical scientist upon observation and experiment,—because it is not a freedom which has been wrested from a grudging opponent, but a freedom which he has bestowed upon himself. And in such an achievement there is little glory.

Nevertheless the chess-player and the mathematician must be placed in different categories, for the true mathematician is not willing to be considered the devotee of "playing the game." He feels the *significance* of concrete experience. If he invents a branch of mathematics and cannot show either an interpretation for his undefined symbols or an application in the treatment of some preexisting problem, his work will be liable to neglect and rejection. It is demanded of him that he *demonstrate* the consistence of his axioms by concrete illustrations, and he in his turn demands of logic that it give him a definition of consistency. Once this definition is gained, he considers himself bound by it. The logic, however, must in its turn be justified. How can its postulates be shown to be consistent and mutually independent? The answer is short and to the point, they *cannot.*

We are led to a new point of view. Logic does not contain an "ought," nor yet an "is"; it is an *accepted code of validity,* a kind of gentlemen's agreement, the violation of which should lead to scientific ostracism. So much in the abstract, but how are we to give this code content? If individual choice is allowed to interfere, we destroy the acceptability of the code, its universality. The Gordian Knot is not to be loosened; it must be cut. Just as the proof of the pudding is in the eating, so the justification of logic is in its use; we guarantee the acceptability of the code by defining it as what is accepted.

Thus if we are to give logic a progressively definite content we must condemn it to a patient abstraction from, and analysis of, the best usage of science. The logician, from this point of view, no longer dwells in lofty *a priori* solitude, holding absolute dominion over science and mathematics, but descends to the uncomplaining study and interpretation of the content of these subjects, having learned that true mastery is to be gained by service. Thus we are led again to the sphere of the concrete event and we might be supposed to have returned to our starting-place. The process is not a circle, however, and this new point of view is infinitely higher than the first. When we fully realize that consistency itself is given content by the *will to be consistent,* we see how it is that mathematics is an expression of that will exercising itself upon and in an independent world. The freedom which is present is not a freedom which is to be desired, but which is to be resolutely denied. We do not find the code of Aristotle springing full-born from the depths of his subjective experience; it is the result of his and Plato's study of the biology and mathematics of their day, and no one would term the pre-Aristotelian geometry illogical because when it was invented, there was no such thing as logic.

Logic is the articulate development of the determination to be rational, and the progress of exact thought brings with it an increasing comprehension of the fact that the will to be rational is at once its motive power and its goal. The aim toward independence of the subjective does not give us independence, but it keeps us moving in that direction in which independence lies,—for he alone is a slave who is content to be one. The study of scientific and mathematical method may not give us forthwith our goal of a universally accepted code; we may not be able to realize the conception of a time when the way men ought to reason, the way men do reason, and the accepted code will coincide in part and whole. Yet it is no small thing that we are able to appreciate that the march of rational thought lies along this line, that logic is given content by the impulse toward rationality and that he knowledge of this content is to be gained by a study of the process itself. We are at least in possession of the differential coefficient.

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INDEPENDENCE PROOFS AND THE THEORY OF IMPLICATION.

Mathematical or Symbolic Logic claims to present a theory of deduction. It is the thesis of this article that the traditional symbolic logic, represented by the system of Whitehead and Russell's *Principia Mathematica,* fails to give a correct theory of mathematical deduction. It will be shown that the notion of mathematical deduction involved in the recognized methods of proving the independence of sets of postulates is incompatible with the theory of deduction furnished by mathematical logic.

Modern workers on the foundations of mathematics have formulated certain methods for the proof of the independence of a set of assumptions or postulates for a deductive theory. In a set of independent postulates no one of the postulates is deducible from the others. To prove the independence of a set of assumptions one must show, for every assumption of the set, that it cannot be derived as a formal consequence from the other assumptions. Huntington[1] has formulated the method as follows, "The method for establishing the independence of a set of postulates consists in exhibiting, in the case of each postulate, an example of a system which satisfies all the other postulates of the set, but not the one in question." "In this section we establish the independence of the postulates A1 – A4, M1 – M5, by exhibiting, in the case of each of the postulates, a system which satisfies all the other postulates, but not the one for which it is numbered. No one of the postulates, therefore, is deducible from the remaining postulates, for, if it were, then any system which possessed all the other properties would possess this property also, which, as the examples show, is not the case." The method has been formulated by Young[2] in almost the same language. "The second fundamental property sought for in a set of assumptions is independence. By this we mean that none of the assumptions can be derived as a formal logical consequence from the others.... In general, an independence proof is constructed in the following way: Let there be given a set of assumptions of any nature, numbered 1, 2, 3,.... *n*, and let it be required to prove that assumption *no.k* is independent of all the others. We must find one concrete representation for which all the assumptions, except *no.k*, are satisfied and for which *no.k* is not true. The exhibition of such a concrete representation constitutes an independence proof of the assumption *k*."

The foregoing quotations from mathematicians indicate precisely the notion of independence. It is clear that the concept of independence involves the nature of logical deduction; hence the method of independence proofs affords a test for a theory of logical deduction.

Now it is the claim of symbolic logic that it furnishes the rules of deduction whereby theorems may be deduced from fundamental assumptions. Thus Mr. Russell[3] states, "Symbolic or Formal Logic —I shall use these terms as synonyms—is the study of the various general types of deduction.... What symbolic logic does investigate is the general rules by which inferences are made, and it requires a classification of relations or propositions only in so far as these general rules introduce particular notions."

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[1] The method of independence proofs may be studied in any of the monographs and articles by Prof. E. V. Huntington. The above quotations are from his monograph on *The Fundamental Laws of Addition and Multiplication in Elementary Algebra*, pp. 4 and 32.

[2] J. W. A. Young, *Fundamental Concepts of Algebra and Geometry*, p. 47.

[3] Bertrand Russell, *The Principles of Mathematics*, pp. 10 and 11.

The *Principia Mathematica*[4] offers a theory of logical deduction. Thus, "The purpose of the present section is to set forth the first stage of the deduction of pure mathematics from its logical foundations. This first stage is necessarily concerned with deduction itself, i. e., with the principles by which conclusions are inferred from premises.... It is in fact the theory of how one proposition can be inferred from another. Now in order that one proposition may be inferred from another, it is necessary that the two should have that relation which makes the one a consequence of the other. When a proposition q is a consequence of a proposition p, we say that p implies q. Thus deduction depends upon the relation of implication, and every deductive system must contain among its premises as many of the properties of implication as are necessary to legitimate the ordinary procedure of deduction. In the present section, certain propositions will be stated as premises, and it will be shown that they are sufficient for all common forms of inference. It will not be shown that they are all necessary, and it is possible that the number of them might be diminished. All that is affirmed concerning the premises is (1) that they are true, (2) that they are sufficient for the theory of deduction, (3) that we do not know how to diminish their number."

Thus it is evident that symbolic logic purports to furnish the principles of logical deduction, by means of which theorems are deduced as logical consequences from fundamental assumptions. Logic thus presents an organon of proof.

What now is the nature of deduction in symbolic logic, in comparison with the deduction of mathematical practice? In the following, I shall show that logical deduction, as implied by the method of independence proofs, is at variance with the theory of deduction, as formulated by symbolic logic. Huntington's assumptions for algebra may be used in illustration. Of the set of independent postulates, let us consider the following two,

A2 $(a+b)+c=a+(b+c)$
M5 $a\times b=b\times a$.

Now symbolic logic offers as a true theorem, the rule that a true proposition is implied by any proposition, i. e., theorem *2.02 of *Principia Mathematica.* Let us apply this rule of inference to Huntington's independent postulates.

2.02 $q \cdot \text{c} \cdot p \, \text{c} \, q$;

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[4] Whitehead and Russell, *Principia Mathematica.* Vol. I, p. 94.

substituting M5 for q in 2.02, we get,

$$a\times b=b\times a\cdot\mathrm{c} : p\cdot\mathrm{c}\cdot a\times b=b\times a.$$

Applying *1.1, the Principle of Inference, we deduce

$$p\cdot\mathrm{c}\cdot a\times b=b\times a.$$

Substituting A2 for p in the above expression, we get,

$$(a+b)+c=a+(b+c)\cdot\mathrm{c}\cdot a\times b=b\times a.$$

Since $(a+b)+c=a+(b+c)$ is one of the postulates of the system, we are able to deduce the other postulate by again applying the Principle of Inference.

Thus by rigorous logical deduction we have succeeded in establishing a relation of implication between two independent postulates, and thus the one postulate is logically deducible from the other. The same proof can be applied to the other members of the set, and hence the set of postulates is not independent.

Now it probably will be maintained that the foregoing proof is incorrect. Huntington's postulates are propositional functions, whereas the above theorem of the *Principia* states implications for propositions. But the implication upon which the defender of the *Principia* will rely is formal implication, and formal implication involves a relation of propositional functions.

The contention of critics will be that the concept of independence applies only to postulates, that is, to propositional functions, and not to propositions. But in reply it may be argued that the concept of independence is applicable to propositions, as well as to functions. It is evident that deductive relations can be set up between propositions. In the case of postulates for geometry, those of Euclid, for example, the deductions may be carried out with the propositions which result when a concrete interpretation is given to the system. Indeed, the first deductions were of that nature. Deduction was discovered with reference to propositions, and the extension of the idea of deduction to propositional functions is a comparatively recent development. Hence we must admit that there may be deductive relations between propositions.

Now the aim of independence proofs, practically, is to show, once and for all, that certain deductive relations cannot be established between postulates. Independence proofs are for the purpose of avoiding further attempts to deduce postulates from other postulates. And the results of this method should be available for the relations between propositions, as well as between functions. By independence proofs we prove the postulates of abstract geometry to be independent. But it is equally of interest to know that the fundamental propositions of Euclid, which result when we give a definite interpretation to the blank forms, are also independent. Otherwise we might seek to reduce the number of the propositions which correspond to the postulates of the abstract theory. This was the aim of Euclid and his followers, who tried to prove the parallel postulate, but without success. But this failure did not prove the absence of deductive relations; independence proofs are required to set the matter at rest. Surely it is relevant to say that in a concrete geometry the parallel postulate is independent of the other postulates, and not that it is independent only in the abstract system. I conclude that it is decidedly of value to be able to speak of the independence of propositions.

Thus far I have argued that the notion of independence is of value with respect to propositions, as well as to functions. In that case it is advisable for the sake of simplicity to employ a notion of independence which can be applied to propositions, as well as to functions. This demand is strengthened by the fact that, using the ordinary methods of mathematicians for the deductions between propositions, no one has yet succeeded in establishing deductive relations between propositions which result when concrete interpretations are given to independent postulates. This creates a presumption that no deductive relations can be established between these propositions, and suggests that when no deductive relations can be established between postulates, they cannot be established between the corresponding propositions. That is, it appears as if the mathematicians used independence in the same sense for propositions, as for functions. If now, we hold that independence has the same meaning for propositions as for functions, an independence proof for functions is an independence proof for the corresponding propositions. The presumption created by the failure to find deductive relations for propositions or functions, is then transformed into definite proof by the establishment of independence proofs for the corresponding functions.

I have said that the failure of mathematicians to find deductive relations between the propositions, which correspond to independent postulates, creates a presumption that independence applies to propositions, as well as to postulates. This is further supported by the fact that deductions of theorems from assumptions proceed, in mathematical practice, by the same methods, whether the assumptions are kept in postulate form or are given a concrete interpretation. Thus consider two assumptions $xRy \cdot yRz \cdot \mathrm{c} \cdot xRz$, and $xRy \cdot \mathrm{c} \cdot yRx$. In determining their deductive relations, Huntington does not give a concrete interpretation to the x, y, R; x and y may be numbers or points, R may be "smaller than" or "to the left of," etc. Huntington deduces his theorems in functional form. But suppose he started out with the interpretation of x and y as numbers and R as "smaller than." Then his deductions would proceed in exactly the same way. The main purpose of working with blank forms is not merely to obtain generality, but also to avoid the tendency of the mind to rely upon intuition. But in the latter case the argument for the use of the blank form in deduction is psychological rather than logical. If we are careful, we can deduce with propositions, and avoid the dangers of intuition; and our deductive procedure will be exactly the same as for the blank forms. There is no difference in the machinery of deduction for propositions or propositional functions. If that is the case, one is inclined to the opinion that independence must have the same fundamental meaning for propositions, as for propositional functions.

Let us now recapitulate the argument. I showed that by means of the theorems of the *Principia* it is possible to establish deductive relations between independent postulates. Confronted by the distinction between postulate and proposition, I pointed out that in mathematical practice this distinction is not relevant to the concept of independence. There is reason to believe that from the mathematician's point of view, independence of postulates involves the independence of the corresponding propositions. The attempt to save the *Principia* by this distinction is not adequate. Even if we are unable, by means of the *Principia*, to prove the postulates dependent, we can prove the dependence of the corresponding propositions, which seems to be in conflict with mathematical practice. But even this way of escape seems closed to the defenders of the *Principia*, for it seems possible to argue that we can set up implication relations between the propositional functions, which by means of independence proofs are proved to be independent. The question is whether there is an analogue, for propositional functions, of $q \cdot \mathrm{c} \cdot p \, \mathrm{c} \, q$. If there is such an analogue, then Huntington's independent postulates may be substituted and proved no longer independent. There is evidence to believe that we can establish such an analogue.

Consider the proof of *9.34, which is, $(x)\cdot\phi x\cdot\mathrm{c} : p\cdot\mathrm{v}\cdot(x)\cdot\phi x$. We start out with *1.3, $q\cdot\mathrm{c}\cdot p\,\mathrm{v}\,q$, and
substituting ϕx for q we get,

$$\phi x\cdot\mathrm{c}\cdot p\,\mathrm{v}\,\phi x.$$

Now the next step uses *9.13, by means of which a real variable is turned into an apparent variable. This then implies that the ϕx in the above proposition is a propositional function.
Now for our purposes we also substitute ψy for p, and thus get

$$\phi x\cdot\mathrm{c}\cdot\psi y\,\mathrm{v}\,\phi x.$$

By the same principle one can establish

$$\phi x\cdot\mathrm{c}\cdot\psi y\,\mathrm{c}\,\phi x.$$

Thus we have the analogue of "A true proposition is implied by any proposition," for propositional functions. By substituting Huntington's independent postulates we seem to be able to come out with implication relations between these postulates. Since they are assumed, we can apply *1.11, the Principle of Inference with respect to functions, and thus deduce one independent postulate from the other.

Now it may be objected, although with no apparent ground, that my argument requires the right to substitute ϕx for q and ψy for p. But the legitimacy of this seems to be even further supported by the results obtained by generalization. Let us begin with

$$\phi x\cdot\mathrm{c}\cdot\psi y\,\mathrm{c}\,\phi x.$$

By the use of *9.13 and proposition *9.21, which is

$$(x)\cdot\phi x\,\mathrm{c}\,\psi x\cdot\mathrm{c} : (x)\cdot\phi x\cdot\mathrm{c}\cdot(x)\cdot\psi x,$$

we can set forth the following steps,

$$\begin{aligned}
&\phi x\cdot\mathrm{c}\cdot\psi y\,\mathrm{c}\,\phi x.\\
&(x) : \phi x\cdot\mathrm{c}\cdot\psi y\,\mathrm{c}\,\phi x.\\
&(x)\cdot\phi x\cdot\mathrm{c} : (x) : \psi y\cdot\mathrm{c}\cdot\phi x.\\
&(x)\cdot\phi x\cdot\mathrm{c} : \psi y\cdot\mathrm{c}\cdot(x)\cdot\phi x.\\
&(y) :\cdot (x)\cdot\phi x\cdot\mathrm{c} : \psi y\cdot\mathrm{c}\cdot(x)\cdot\phi x.\\
&(x)\cdot\phi x\cdot\mathrm{c} : (y) : \psi y\cdot\mathrm{c}\cdot(x)\cdot\phi x.\\
&(x)\cdot\phi x\cdot\mathrm{c} : (y)\cdot\psi y\cdot\mathrm{c}\cdot(x)\cdot\phi x.
\end{aligned}$$

Now on p. 139, Vol. I, of the *Principia*, we are told that $(y)\cdot\phi y$ is the same proposition as $(x)\cdot\phi x$.
Hence we may write,

$$(x)\cdot\phi x\cdot\mathrm{c} : (x)\cdot\psi x\cdot\mathrm{c}\cdot(x)\cdot\phi x.$$

Now *9 proves that apparent variable propositions may be substituted for p, q, r, in the propositions of the numbers from *1 to *5. Hence the proposition at which we arrived, starting from $\phi x \cdot \mathrm{c} \cdot \psi y \cdot \mathrm{c} \cdot \phi x$, is known to be true by another method. Since we have arrived at a true conclusion by correct reasoning, the starting-point must have been at least probably valid. In other words, the true consequence deduced from $\phi x \cdot \mathrm{c} \cdot \psi y \cdot \mathrm{c} \cdot \phi x$ further supports the right to assert it. This line of argument is further supported by the fact that the halfway stage, $(x) \cdot \phi x \cdot \mathrm{c} : \psi y \cdot \mathrm{c} \cdot (x) \cdot \phi x$, evidently can be asserted. For, as a consequence of *9, the truth of

$$(x) \cdot \phi x \cdot \mathrm{c} : p \cdot \mathrm{c} \cdot (x) \cdot \phi x$$

cannot even be questioned, and using the method of *9.34, we get

$$(x) \cdot \phi x \cdot \mathrm{c} : \psi y \cdot \mathrm{c} \cdot (x) \cdot \phi x.$$

We thus have direct and indirect evidence for the right to assert $\phi x \cdot \mathrm{c} \cdot \psi y \, \mathrm{c} \, \phi x$ and to use it to establish implication relations between propositional functions.

Now there is even another way of approaching the matter. From the doctrine of systematic ambiguity one would be inclined to suspect that the *Principia* would permit the substitution of functions for p, q, r, etc. That this has been done seems clear from a study of the proofs.

Consider the proof of *22.51 $\alpha \times \beta = \beta \times \alpha$.[5]
We start out with *22.33 $x \epsilon \alpha \times \beta \cdot \equiv \cdot x \epsilon \alpha \cdot x \epsilon \beta$.
Now *4.3, which is next used, is $p \cdot q \cdot \equiv \cdot q \cdot p$.
Substituting $x \epsilon \alpha$ for p, and $x \epsilon \beta$ for q,
we get $x \epsilon \alpha \cdot x \epsilon \beta \cdot \equiv \cdot x \epsilon \beta \cdot x \epsilon \alpha$.
Thus the procedure of deduction demands that $x \epsilon \alpha$ and $x \epsilon \beta$ be substituted for p and q.

But $x \epsilon \alpha$ and $x \epsilon \beta$ are propositional functions. Now most of the proofs in the calculus of classes require the substitution of propositional functions like $x \epsilon \alpha$, $x \epsilon \beta$, for p, q, etc. Thus it seems that we may substitute propositional functions for p and q. Hence there seems to be no reason why we may not substitute propositional functions in propositions such as $q \cdot \mathrm{c} \cdot p \, \mathrm{c} \, q$. That is, we may substitute Huntington's independent postulates and thus establish implication relations between them. Then by the application of the Principle of Inference it is an easy matter to deduce one propositional function from the other. Thus despite independence proofs, we are able, by means of the *Principia,* to deduce one independent postulate from another, and we have now seen that the difficulties are not set aside by the distinction between propositional functions and propositions.

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[5] The symbol $\times$ is employed as the sign of multiplication, instead of the symbol used in the *Principia*.

The only set of independent postulates is one which consists of only one postulate. As soon as two postulates are assumed as the basis of a deductive system, we are able to deduce, as the first theorem, that they are not independent, no matter whether they are propositions or functions.

The conclusion to be drawn from the preceding discussion is that the theory of deduction of the symbolic logicians is not in agreement with the sort of deduction used by the mathematicians.[6] Postulates proved to be independent by the method of independence proofs can be shown to be dependent by the rules of the *Principia.* Either symbolic logic does not furnish safe rules of deduction for pure mathematics, or else mathematicians, who have used independence proofs to show that assumptions are not deductively related, have been wandering in error.

V. F. LENZEN.

BOOK REVIEWS AND NOTES.

MEDICAL CONTRIBUTIONS TO THE STUDY OF EVOLUTION. By *J. G. Adami, M.D., F.R.S., F.R.C.P.* Pp. xviii, 372. London: Duckworth and Co., 1918. Pris 18s. net.

The first part of this very stimulating book consists of the Croonian Lectures of 1917 delivered before the London Royal College of Physicians on "Adaptation and Disease," and the two other parts, "Heredity and Adaptation" and "On Growth and Overgrowth," are reprints of earlier (1892-1914) papers and addresses by the author which bear upon adaptation and tissue modification. In fact, Dr. Adami found that his earlier work was not known to biologists, and it also seemed useful "to present the conclusions reached, not so much from the point of view of their medical bearing, as from that of their biological significance, in order that both morphologist and physician might observe the direction in which medical research is surely leading us with reference to matters which form the basis of general biology."

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[6] The conclusions of this article agree with the criticisms of the *Principia* by Prof. C. I. Lewis. Professor Lewis's algebra of strict implication is the only deductive theory, of which I know, which is in accord with the kind of deduction used by mathematicians in independence proofs.

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CARLYLE'S PLACE IN PHILOSOPHY.

CARLYLE was not, in the technical sense, a philosopher. According to one eminent critic[1] it is a monstrous thing to have applied such a name in any sense to the man who never set out from premises and reasoned his way to conclusions, and who never thought calmly but always in a passion. Indeed the objurgatory tone in which Carlyle alludes to the current systems and controversies may well suggest a complete detachment from any "philosophic" interest whatever. Such speculation betokened for him a sceptical, and hence a paralytic, period of the world. He looked back with wistfulness to the time when all men could still avow the same unhesitating *Credo,* when Mother Church still supplied to each a competent theory of the universe.[2] What William James has called the "divided soul" was to Carlyle an object of constant pity, and we can imagine the rapture with which he would have welcomed the conception of the "once-born." It was he who coined the phrase "disease of metaphysics."[3] It was he who mourned that religion had degenerated into theories of religion, into mere apologetics "endeavoring with smallest result to make it probable that such a thing as religion exists."[4] It was he who dismissed political science with the scornful comment that this sort of inquiry makes ever a renewed appearance in ages of decadence.[5] It was he who instituted that pungent contrast between Bacon, "discovering a new method of discovering truth"—a *novum organum* which was to "make men of us all"—and Kepler, "making by natural *vetus* organum, by the light of his own flaming soul....the greatest discovery yet made by man."[6] And it was he who stigmatized as an ultimate, unsurpassable folly in modern thought the enterprise of "accounting for the moral sense."[7]

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[1] Herbert Spencer; see *Autobiog.,* I, 380ff.

[2] "Characteristics," *Crit. Misc.,* III, 29.

[3] *Ibid.,* p. 25.

[4] *Ibid.,* p. 23.

One must, indeed, remember his concession that the mental sciences, although an evil, are a necessary evil. He held that they could reach no positive result, but that they must be pursued to their end, that they must be judged, as our Hegelians would say, by themselves at a further stage. It was something that reflection should thus be brought to a wholesome crisis, that it should be made to demonstrate its own futility, and the fire of scepticism thus burn itself out.[8] The way would then be clear for a reassertion of the healthy instincts and intuitions of mankind. Yet surely, if we bring together the relevant passages in Carlyle's works, we find that his own method of thinking yielded something far beyond this merely negative outcome. Like every one else who has set out to overthrow systematic reason, he has ended by giving us a system, more or less coherent, of his own. The present article will limit itself to the field of ethics and metaphysics, endeavoring to show that Carlyle's genius there anticipated some results to which a later generation had to attain step by step. It is true that he expressed himself in a language very different from that of the schools. Much of his energy was devoted to denouncing the utilitarian ethics, but a Mill or a Bain could see little in what he said which even called for a reply, little more in short than a windy rhetoric which invariably missed the point. And even philosophers far removed from Mill or Bain have not, as a rule, thought of Carlyle as among the effective critics of empiricism. They have felt that the true answer is not his, but that of a calm, scientific analyst. I shall contend on the other hand that, so far from being in this province only a heated and irrelevant rhetorician, he laid his finger with astonishing accuracy upon just those weaknesses in the empirical school which later examination has forced all men to acknowledge. He avoided the technical jargon, and made his points in his own way. If those points are now among the commonplaces of text-book criticism, we must remember that fifty years ago to the dominant English philosophy they were rather obscurantist paradox. It is time for us to give due credit to one whose sensibility, like that of the artist in *Daniel Deronda,*[9] seized combinations which science now explains and justifies.

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[5] *F. R.*, II, 7. Cf. "Characteristics," *Crit. Misc.*, III, 13.

[6] *Historical Sketches*, p. 132.

[7] "Shooting Niagara," *Crit. Misc.*, V, 28.

[8] "Characteristics, *Crit. Misc.*, III, 40.

I.

a. It is usual to quote *Characteristics* as containing the principle that philosophy is a useless and an impossible pursuit. But this was not Carlyle's earliest, and it is not his most constant, attitude. His complaint in *Signs of the Times* is rather that the subject is dead, gone with Dugald Stewart, "its last amiable cultivator." And he found the cause of its death in the fact that it had become completely mechanized. The *Zeitgeist* was wholly mechanical. Power looms, steamships, school "methods" in education, institutional churches, "Royal and Imperial Institutes" for the advancement of literature,—these were all products of a common spirit, all tokens of the prevailing trust in machinery. Did not the new-fangled incubator

[9] *Daniel Deronda,* Chap. XLI.

threaten to supersede the activities of the brood-hen?[10] This faith in external apparatus seemed to Carlyle to have gone much too far, for it had obscured the one thing needful. Creative work had its ultimate source in a native insight, which could never be analyzed into a combination of forces artificially put together. It was the silent thought of a Newton, with little equipment beyond paper and pencil, which had given us the system of the planetary paths. What one saw in the later, mechanical days was a museum with retorts, digesters, and galvanic piles, where Nature was being interrogated by "some quite other than Newton," and Nature in turn showed no haste to respond.[11]

The same spirit had given us mere physiological psychology as an account of man's intellectual life. Carlyle saw with horror that the school of Locke still reigned, with its laws of association, its resolving of the mental enigma into a problem in coexistences and sequences as these reveal themselves to a superficial introspection. Thinking was "explained" by having its physical concomitants pointed out. The hope seemed to be cherished that higher power microscopes might yet enable mind itself to be *seen*! Had not Cabanis lately announced that thought is a "secretion" and that the spiritual product which we call poetry is the special province of the smaller intestines? This to Carlyle was not so much a falsifying as a simple ignoring of the true philosophic problem. Where mechanical causation was thus assumed as the key to all phenomena, no one would raise the previous issue as to the very notion of cause. The grand secrets of the soul's relation to time, to space, to the universe of matter, and to God, had quietly dropped out of sight.[12]

The futility of this mechanical method is illustrated by a profusion of examples from the moral and social sphere.

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[10] "Signs of the Times," *Crit. Misc.*, II, 60.

[11] *Ibid.*, p. 62.

[12] *Ibid.*, p. 64.

Bentham had envisaged mankind after the manner of physics, as a collection of spiritual atoms, each acted on by motives, which turn out in the end to be varied combinations of a single motive—the desire for pleasure.[13] Yet who ever saw a human being thus dragged hither and thither by impulses external to himself? How could such a formula explain the heroisms and the chivalries of history?[14] Was it not plain that a nice balancing of this motive against that, with a determination at all costs to procure for oneself a surplus of enjoyment, was just the account which should *not* be given of Crusaders, of Puritans, of Christian martyrs, of French Revolutionists, of any one in short who acted under a flaming passion? So far from its being true that mankind could follow only the line of greatest ease and of least resistance, we should rather say that enterprises of hardship and of difficulty are the real allurements for the human heart.[15] Witness the poor swearing recruit who does not think primarily of the shilling a day but of "the honor of a soldier," and even the most frivolous class in our society who, if they can remember nothing else, still make much of what they call "a point of honor."[16] For the principle of greatest happiness thank God there were always some who would substitute the principle of greatest nobleness.

Moreover, argues Carlyle, if we grant for a moment this atomistic psychology of motive, we shall be left with the idea of obligation not only unvindicated but even unexplained. For the criterion of mere pleasingness could give no priority to one pleasure over another. Nor was there any principle by which such random impulses in a multitude of men could be united into a social whole. If every man's selfishness, infinitely expansive, were to be hemmed in only by the infinitely expansive selfishness of every other man, upon what centripetal force could we rely to prevent a return to chaos?[17] Conscience surely was something more than a suborned auxiliary, useful for social purposes to the constable and the hangman. The checks and balances and all the cunning mechanism of self-interest which utilitarian philosophers valued so highly were nothing but so many efforts to solve this problem: "Given a world of rogues, how to produce an honesty from their combined action?"[18] Terrors of conscience to such men would be of little worth, not to be compared, for example, with diseases of the liver. If obligation meant no more than this, then "not on morality but on cookery let us build our stronghold; there, brandishing our frying-pan as censer, let us offer sweet incense to the Devil, and live at ease on the fat things he has provided for his elect."[19]

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[13] Cf., e. g., *Heroes*, Lect. II.

[14] *Sartor*, III, 3.

[15] *Heroes*, II.

[16] *Ibid.*

The last unavailing protest against this spirit of mechanizing had, in Carlyle's view, been raised by the Scottish school, which was clear-sighted enough to recognize whither things were tending, but was itself too deeply sunk in the same error to find any solution. Reid had a dim notion that something was wrong, but knew not how to right it. So, instead of boldly denying the premises, he "let loose instinct, as an undiscriminating bandog to guard him against the conclusions!"[20]

b. But our author has a more serious criticism upon philosophers than any which confines itself to the method or the results of a particular group of them. In *Characteristics* he appears at all events to contend that the whole enterprise of philosophy involves a mistake.

He likens the questioning mind to the disordered body. In each case an acute consciousness of self is a symptom that something has gone astray. The normal organ does not need to be watched, or constantly readjusted, and the normal spirit would never be distracted by "problems" or arrest its harmonious functioning in order to introspect. This analogy is driven home by vivid examples;—the rude countryman, in perfect health just because, so far as he knew, he had no "system"; the skilled boxer, innocent of anatomy, who would not hit better for having studied the *flexor longus* and *flexor brevis*; Walter Shandy whose reasoning was not perceptibly improved by a course in Aristotle. Anatomists and metaphysicians were to be reckoned among the melancholy products of the fall of man. The beam of white light renders all things visible, but, because of its very whiteness, is itself unseen, and some irregular obstruction is required to break it up into colors. In the same sense discussions, about virtue for example, are a sign that virtue is on the wane. Patriotism is losing its grip when men write treatises to give it a basis. Social cohesion is in a bad way when a *Contrat Social* is needed to solder men together. The publication of Paley's *Evidences* was an ominous portent for religion. For everywhere the token of health is unconsciousness, and the token of disease is an anxious listening to oneself.

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[17] "Voltaire," *Crit. Misc.*

[18] Cf. Bentham's own description of the Panopticon as "a mill for grinding rogues honest and idle men industrious." (*Works*, X, 226.)

[19] *Sartor*, II, 7.

[20] "Signs of the Times," *Crit. Misc.*, II, 64.

Applying this to metaphysics, our author points out that the quest for a theorem of the universe proceeds from a break-up of the true spiritual unity. And at bottom what it asks is impossible. The universe cannot be put into a theorem by any finite mind. If he had to choose between them Carlyle would prefer dogmatic to sceptical speculation; not that either can heal the disorder of the soul, but that one is, relatively speaking, a stage of convalescence, the other a stage of relapse. The whole spurious problem means an attempt of the mind to pass beyond itself, to reach a point of view from which it can judge not only other things but itself also *ab extra*. The act of knowing is everywhere conditioned by the subject-object contrast; yet the metaphysician would fain compel this very machinery to account for the conditions of its own action. He would know absolutely that which, *ex hypothesi,* he can know only as related. Carlyle illustrates this procedure by two similitudes which are at least as striking as any which the critics of absolutism have since devised, that of the athlete who would so develop his sinews that he may be able to lift up his own body, and that of the Irish saint who swam the Channel, carrying his head in his teeth.[21]

Such being the metaphysical purpose, it was easy to see why the labor of thousands of years had been so inexpressibly unproductive. For instance, how pathetic, yet how fatuous, had been the attempts to demonstrate a God! As if a God who could be *proved,* or—more ludicrous still—rendered *probable,* would not thereby take his place as just one object among other objects, rather than as that in which all alike live and move and have their being! What, asks Carlyle, was this problem which the poor deists set themselves, but to ground the beginning of all belief in some belief earlier than the beginning?[22] And was it not high time to confess that if intellect, or the power of knowing and believing, is synonymous with logic, or the mere power of arranging and communicating, no proof of a Deity is to be had? At the utmost one might reach that *Etre Suprême,* the subject of Robespierre's "scraggiest of prophetic discourses."[23] Metaphysical theology had been but the multiplication of words, until the earth groaned under accumulated phrases, but the enterprise was foredoomed from the start. "*Cogito, ergo sum*: Alas, poor Cogitator, this takes us but a little way....The secret of man's being is still like the Sphinx's secret, a riddle that he cannot rede."[24] For Carlyle's own part, the utmost he had got from metaphysics—and it was no small gain in a sense—was the bliss of becoming delivered from them altogether.[25] Hume and Diderot on the one side, Kant on the other, served but to refute the alternative conclusions, and to confirm by trial what might have been foretold from the very terms of the problem, that the metaphysical road leads nowhere.

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[21] "Characteristics," *Crit. Misc.*, III, 27.

[22] "Diderot," *Crit. Misc.*, 237.

[23] "Mirabeau," *Crit. Misc.*, 407; cf. *F. R.*, VI, 4.

II.

It has often been said that a thoroughly consistent scepticism ought to be silent, and one might conclude from the foregoing argument that its author would advance no positive doctrine of his own upon subjects which he had thus declared inscrutable. Moreover, his repeated insistence on the vanity of all "speech about the unspeakable things" has given rise to the well-worn jest that Carlyle preached the gospel of silence in thirty volumes. But we have seen that the discussion which on these high altitudes he condemned as useless was that of the logical or demonstrating type, where the basis of all thought is forced under thought-categories, and the arguer affects to prove that which is already assumed in every process of proof. If the sphere of science may be compared to territory which we can look at from outside, what is the analogue to that ground which we cannot see, just because we have to stand upon it in order to see all the rest? If it should turn out that logical demonstration is not man's only organon of truth, one may without incoherence set forth in words that other spiritual functioning, so far as words will serve to give it expression. The route by which Carlyle thus went forward to his cosmic scheme seems to have been as follows.

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[24] *Sartor,* I, 8.

[25] *Lectures on Literature.*

Destructive criticism has so far simply cleared the ground. If it has been correct it has shown that the methods of the sciences, and of that metaphysic which is no more than a unification of the sciences, can tell us nothing on the problems which matter most of all, problems of the ground of all being, of freedom and necessity, of good and evil, of the nature and prospects of the soul. For that with which the sciences deal is always something which I may call *mine* but which I cannot call *me*. Every attempt to resolve the latter into a combination of the former may be convicted of contradiction, for it takes as independently real those objects which can exist and contain meaning only in reference to a subject. Science is thus always a study of some species of *clothes,* and to know the limitations of science we require above all a *clothes-philosophy*. "Let any cause-and-effect philosopher explain, not why I wear such and such a garment, obey such and such a law, but even why I am here, to wear and obey anything."[26] The real question thus becomes one which it is scarcely possible to formulate, and wholly impossible to answer, within the categories of cause-and-effect reasoning. For the thing we seek to know is not what particular effect was produced by a particular cause, but what is the total significance of a universe in which such a nexus of causality has been established, and whether that nexus is itself an instrument in a deeper plan. Our very capacity of putting this problem is itself a token that we are not mere items in the series whose meaning we thus challenge. We are able somehow to get outside of it, to become its critics. And although the intellectualist metaphysicians have so far attempted the absurd task of construing it as a whole through principles which are valid only from part to part, the very persistence of their effort proves how fundamental is that impulse which they have so blunderingly followed.

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[26] *Sartor,* I, 5.

Thus for Carlyle as for Wordsworth the unique position of man in the universe was evidenced above all by his

> "obstinate questionings of sense and outward things."

Man's unhappiness came of his greatness. The happiness of one shoeblack could not be assured by all the finance ministers and upholsterers and confectioners of modern Europe, for the shoeblack had a soul quite other than his stomach.[27] The starting-point for Carlyle's own cosmic scheme is just the contradiction between man as moral personality and the world as fixed under mechanical law within which this personality must unfold itself. It was necessary that these two aspects of the universe should somehow be thought together. Their unification through a mechanizing of the moral life, or through a subjection of mind to one of its own categories, had already proved impossible. What other alternative remained? Carlyle turned for a reply to that way of thinking which, under the title "German philosophy" had just begun, chiefly through the influence of Coleridge, to make its voice heard in England.[28] It is Carlyle's high distinction that he was one of the two men in the English-speaking world who, as early as 1829, pierced beyond the din about "laws of association" to the deeper issues which Kant had raised for European thought. It is doubtful how far Kant's work was known to him at first hand. He seems to have come into contact with it mainly through such writers as Fichte and Novalis, and, by a singular latitude of interpretation, to have read similar ideas into *Wilhelm Meister* and *Faust*. Nor did he ever take up definite discipleship in the Kantian school. He uniformly speaks of the *Kritiken* as Plato spoke of the conversations of Parmenides; they had suggested to him ideas of far-reaching fascination, upon whose truth he did not presume to pronounce, but whose enormous significance the shallow talkers around him would do well to appreciate if they could.[29] One can easily see, however, that Kant is the true source, direct or indirect, of his whole further development.

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[27] *Ibid.*, II, 9.

[28] Cf. Mark Pattison's statement that even the Oriel "Noetics" know nothing of Continental philosophy. (*Memoirs.*)

Exactly in the spirit of the *Critique of Practical Reason* he lays it down that the approach to a constructive philosophy must lie through the moral consciousness. "The true Shekinah is man."[30] And it is man not on the side of his discordant impulses, or his mushroom speculations. It is man as conscious of duty, as recognizing within him a categorical imperative. Carlyle is very insistent that on the rational and objective, as contrasted with the emotional and subjective, doctrine of conscience the whole fabric of one's world-view must depend. He notes it as a token of the sceptical eighteenth century that men ceased to take moral obligation as intuitive and began "accounting for" it, moreover that they spoke of the antithesis between right and wrong as appreciated by a "sense," as if we had a relish for certain actions, "a sort of palate by the taste of which the nature of anything might be determined."[31] He pities poor Burns as one in whom even at his best morality was "an instinct only," not a rational conviction.[32] He pours scorn upon the attempt to conjure moral objectivity out of sentiments of honor, upon Diderot's "perpetual clatter about *vertu, honnêteté, grandeur, sensibilité, âmes nobles,*" and "that interminable ravelment of reward and approval, virtue being its own reward."[33] He sets in glowing contrast the Mohammedan heaven and hell. Gross and material though they were, we have here a testimony to "that grand spiritual fact and beginning of facts" that "good and evil are no matters of degree, but that they are eternally incommensurable, the difference not one of finite but one of infinite moment."[34] And he returns again and again to Kant's similitude between the starry heavens and the law of duty as a depth of vision beyond which no man has ever seen or can see.

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[29] Cf., e. g., paper on Novalis.

[30] *Sartor*, I, 10; cf. *Heroes*, I, 10.

[31] *Lectures on Literature.*

[32] "Burns," *Crit. Misc.*

[33] "Diderot," *Crit. Misc.*, III, 239.

Although in the paper on Novalis he speaks of the contrast between reason and understanding as one whose subtlety baffled him, while he suspected that is was somehow profoundly true, it is clear that Carlyle had worked his own way to a very similar distinction. Kant's insistence that the moral judgment proceeds from a faculty higher in kind than that which cognizes the relation of object to subject in a mechanically ordered world, is consonant with the whole thought of *Sartor*. Indeed this was but the technical statement of what has been fitly called Carlyle's "mysticism"—a word which amid all its vagueness stands at least for this, that the deepest of all truths are known otherwise than by reasoning. Whether he got this principle from Fichte, or from Böhme, or from Jacobi, is a matter for the Carlyle antiquaries to decide. One may perhaps recall in this connection the protest of Coleridge against those who "have no notion that there are such things as fountains in the world. . . . and who would therefore charitably derive every rill which they behold flowing from a perforation made in some other man's tank."[35] Carlyle's mysticism was at least worked out in an individual way. We get it, for example, in his scorn of those who dwell only "in the thin rind of the conscious,"[36] who recognize like the Encyclopædists no truth except that which can be debated of, and to whom in consequence the "sanctuary of man's soul stands perennially shut." We get it, again, in his famous theory of genius as ever a secret to itself,[37] of the discoverer as incomparably beyond the reasoner,[38] of the truly original mind as unaware of all but a mere fraction of its own active forces.[39] Carlyle would not readily have accepted an idea on this subject from Mill, but he does seem to have had in view just what Mill defined as the purpose of metaphysics, the study—not as in logic of those truths which are admitted on evidence but—of those other truths which may reasonably be admitted without evidence. That there are such truths he was firmly convinced. Where are they to be found?

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[34] *Heroes*, II.

[35] Preface to *Christabel.*

[36] "Diderot," *Crit. Misc.*, III, 234.

[37] "Characteristics," *Crit. Misc.*, III, 5.

If the human soul is the true Shekinah it seems to follow that we must look in man for a light upon the universe, not *vice versa.* If his being cannot be dissolved into uniformities of coexistence and sequence borrowed from the physical sphere, perhaps the outer world may unlock its secret to the key which is furnished by the moral consciousness? Unity may be reached, if not through the mechanizing of man, then through the spiritualizing of nature. By this, however, Carlyle understood no deistic doctrine of a divinely contrived machine, nor yet a world conceived as subject to recurring interference by its Maker. There were no miracles, except in that deep sense in which all is miraculous, the sense that nothing occurs as the result of blind forces, and that behind every scientific "explanation" there remains a mystery which no science can probe. For the cosmic outlook which he thus commends Carlyle has chosen the suggestive name "natural supernaturalism."

He defends it in the first instance by the familiar arguments of the idealist. These come oddly enough from one who professes to have abjured metaphysic, but the paper on Novalis in which they occur belongs to that early period in which Carlyle was still highly speculative. Moreover, if he talks Berkeleianism, he does so not as one who is assured of that system's truth, but rather as one who sees in it enough to stagger the confident apostles of matter and motion. Common sense is convicted of resting upon a spiritual postulate, the postulate that the world is interpretable, that the senses reveal things as they really are, hence that the Power which made and the mind which studies nature are harmonious. "So true is it that for these men also all knowledge of the visible rests on belief of the invisible, and derives its first meaning and certainty therefrom."[40] We are reminded of the relativity of every sense-datum to the organ that receives it, and of the consequent doubt as to what the *absolute* existence of any object can be. Fichte's principle of all phenomena as due to a non-ego, regarding which the last scientific analysis leaves a residuum that is unknowable, is combined with Kant's subjectivity of space and time to lead us into a reverent agnosticism. The reign of wonder is declared to be native to man, for it belongs to him both at his lowest and at his highest. But it is an intermittent reign. In seasons of superficial *Aufklärung* it is a sort of "reign *in partibus infidelium*."[41]

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[38] *Ibid.*, 6.

[39] "Sir Walter Scott," *Crit. Misc.*, IV, 49.

The use of this last phrase is typically Carlylean, one of those revealing comparisons by which, as with a flash, the whole tenor of an abstract argument is lit up. The ubiquitous sway of wonder, against which Diderot and the rest of the cocksure Encyclopædists had effected a local revolt, would reassert itself, even as the Church looked forward to winning back her temporary apostates. Carlyle exhausts himself in depicting how deep is that mystery which real thinkers must acknowledge. Only the surface of things had been or could be penetrated by reflection. What availed it to know that nature was a system, while the laws of the system were known to only an infinitesimal extent? Who could say, for example, what is and what is not miraculous? To the Dutch king of Siam any one with an air-pump and a vial of vitriolic ether might work miracles at will. Our most learned physicist was, relatively speaking, like the minnow that is familiar with the pebbles and crannies of its native creek, but ignorant of trade-winds, eclipses, and monsoons by which the condition of the creek is determined.[42] Man had become so completely the dupe of system that whatever happened frequently was *eo ipso* taken as understood, and only the exceptional was admitted to be mysterious! Nay, it was often sufficient that an event should have received a recognized *name* in order to take it out of the realm of wonder, and place it, neatly ticketed and labeled, among our mental conquests. Yet was it not so that the very commonest facts were among the most inexplicable? "Thou wilt laugh at all that believe in a mystery?....*Armer Teufel!* Doth not thy cow calve? Doth not thy bull gender? Nay, peradventure, dost not thou thyself gender? Explain me that, or do one of two things: retire into private places with thy foolish cackle; or, what were better, give it up and weep, not that the world is mean, and disenchanted, and prosaic, but that thou art vain and blind!"[43]

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[40] "Novalis," *Crit. Misc.*, II, 25.

[41] *Sartor*, I, 10.

Our scientific categories were thus, for Carlyle, mere modes of human classification, which had been found useful within that relatively microscopic area which man has reduced to order. It is against the mistake of accepting them as explanatory of the universe as a whole that Teufelsdröckh does not cease to protest. He is thinking of a metaphysic which employs as ultimately valid such notions as matter and force, forgetful that these are relative to the point of view of the sentient observer, that they are anthropomorphic in the sense of having been borrowed from the inner experience of volition, and that they are thus rather imposed upon than contained within the immediacy of consciousness. He aptly compares this confusion to that of one who should take the clothes in which a figure was dressed for the figure itself. In particular Carlyle welcomes the demonstration by Kant that space and time, the essential forms in which all scientific knowledge has come to us, are products from within, not data from without. He sees here an intelligible construing of the religious doctrine that God is omnipresent and eternal.[44] For its difficulty vanishes once we realize that God exists neither in time nor in space.

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[42] *Ibid.*, III, 8.

[43] Cf. *ibid.*, I, 11.

Thus the Ultimate Reality is conceived almost as Spinoza conceived his Absolute, revealed under attributes to the human understanding, but in no way bound under such attributes in its essential nature. Carlyle, whose acquaintance with Spinoza seems to have been through the medium of Goethe, could find no more adequate expression for this than in the memorable words of the Earth-Spirit in *Faust*:

"In Lebensfluthen, im Thatensturm
Wall' ich auf und ab,
Wehe hin und her!
Geburt und Grab,
Ein ewiges Meer,
Ein wechselnd Weben,
Ein glühend Leben,
So schaff' ich am sausenden Webstuhl der Zeit,
Und wirke der Gottheit lebendiges Kleid."

But that subjectivity under which he condemns our scientific concepts he will not extend to our moral convictions. There is nothing Spinozistic about his treatment of the antithesis between right and wrong. It is never alluded to, in the fashion which we should expect from such a beginning, as a "mode of finitude," or, as Mr. Bradley would say, as a stage in the progress to a point of view at which morality will be seen to be appearance. On the contrary, it is made the root from which objective knowledge, otherwise impossible, is made to spring. Man's intuition of duty is not only sure, it is the ground of his

[44] *Ibid.*, I, 8.

surety that the Absolute too is moral. Carlyle almost coincides with the attitude of Hermann Lotze, that metaphysic, otherwise a confusion in which any judgment is as demonstrable as any other, becomes an intelligible whole when we take the distinctions of conscience as not only *a* truth, but the beginning of *all* truths.

Finally, although such knowledge of the universe as spiritual is not to be attained by reasoning but through moral insight, Carlyle is ready to grant and even to insist that observation and experience may confirm or illustrate a belief which they are powerless to originate. The design argument was useless to create faith, for its strongest evidence lay in the phenomenon that man *searches for* design, and this evidence the poor doubter, by the very fact of his doubting, was unable to appreciate.[45] Yet the contemplation of natural adjustments in all the wonder of their detail might well strengthen a belief in divine order that was already held on higher grounds. The course of history was redeemed from chaos when history was looked upon as the working of the finger of God. But that man's life should be a moral cosmos rather than a moral chaos would appeal only to those by whom the judgments of conscience were already revered. Carlyle rejoiced, however, that man's spiritual nature has a better source from which to sustain itself than by hunting high and low for empirical corroborations that the world is other than a dead machine. He was not dependent on considerations which a Voltaire might "dispute into, or dispute out of" him. Even as consciousness of duty was the mainspring of faith, so it was by the performance of duty that faith became assured. If the universe is the expression of a moral purpose, then those who live nearest to that purpose will be best certified of its reality. The remedy for doubt lay in work, and the work to begin with was the work closest to one's hand. Searching for God by argument was like searching with a rushlight for the noonday sun. If any man will do His will, he shall know of the doctrine.

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[45] Cf. "Diderot," *Crit. Misc.*, III.

There is much in natural supernaturalism which is closely analogous to the once famed "transfigured realism" of Herbert Spencer, just as there is much in Carlyle's apparently pantheistic passages of reverence for "the All" which reminds us of the cult of the Unknowable. It is when moral enthusiasm bursts the barrier of abstract thought that he forbids most definitely this tempting comparison. We shall probably find the most perfect embodiment of his world-view not in any articulated system that could be named, but in two stanzas by the poet Clough:

"And as of old from Sinai's top
God said that God is One,
By Science strict so speaks He now
To tell us There is None!
Earth goes by chemic forces; Heaven's
A Mechanique Celeste!
And heart and mind of human kind
A watch-work as the rest.

"Is this a Voice, as was the Voice,
Whose speaking told abroad,
When thunder pealed and mountain reeled
The ancient truth of God?
Ah, not the Voice; 'tis but the cloud,
The outer darkness dense,
Where image none, nor e'er was seen
Similitude of sense.
'Tis but the cloudy darkness dense
That wraps the Mount around;
While in amaze the people stays,
To hear the Coming Sound."[46]

III.

What value are we to set upon these varied suggestions, both critical and constructive?

The late Professor Windelband has very justly remarked that the philosophic movement of the nineteenth

[46] *The New Sinai.*

century turned upon "the question as to the degree of importance which the natural-science conception of phenomena may claim for our view of the world and life as a whole."[47] He attributes the immense progress of that conception during the earlier years of the century to two causes, the definiteness of scientific results and their utility of application to practical needs. Side by side with this progress one recognizes a decay of the interest generically spoken of as "metaphysical." Its position could not be reestablished until men saw again that science, however definite and certain, moves in a limited sphere, and that the needs of the human spirit go far beyond anything that can be described as "practical".

It is the glory of Carlyle that he maintained throughout the frenzy of English empiricism a firm hold upon the larger issues, and that he did so from no mere prejudice, social or theological, but from a clear-sighted recognition that empirical methods must quickly spend themselves, leaving the old problems just where they were. He once remarked of the eighteenth century that there was illumination indeed, of a kind, "but except the illuminated windows almost nothing to be *seen* thereby."[48] He would have said the same of that "psychogonical method" by which Mill was once thought to have made metaphysics an obsolete pursuit. Psychology is a natural science; as such it rests upon the common axioms and postulates of scientific procedure; and if we have no criterion beyond itself by which the limit of this procedure can be determined, the inference is not that metaphysic must become psychological but rather that it must be abandoned. Carlyle laid down this principle as clearly as Edward Caird himself. And he laid it down at that most opportune moment when psycho-physics threatened to run riot, when phrenology was becoming all the rage, when even Emerson allowed himself to name Spurzheim in the same intellectual class with Lavoisier and Bentham,[49] when even George Sand was poring over the new mapped areas of the phrenological skull.[50] One need not quarrel with him about his rhetoric. If he spoke at times of philosophy in language fit only for the lips of G. H. Lewes, the idea he had in mind was one to which no one like Lewes ever rose. Against phenomenalism of every type he waged the war of a genuine philosopher. Perhaps no admonition could have been more in place to the circle he addressed than his memorable call to close their Voltaire and open their Goethe.

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[47] *History of Philosophy,* transl. by J. H. Tufts, p. 624.

[48] "Voltaire," *Crit. Misc.*

The side of phenomenalism upon which he first seized as surest to reveal its break-down was the mechanizing of the moral life. One must feel no slight amazement at the completeness with which Carlyle anticipated almost every criticism which has since been passed upon the utilitarian moralists, and upon that atomic psychology which their system as then announced took for its starting-point. For, excepting his short and very unfruitful apprenticeship in the lecture-room of Thomas Brown, he was no technically trained philosopher. He belonged to the class now so nearly extinct of the general "man of letters"—like Macaulay, for example; and if we would appreciate his insight we cannot do better than compare Carlyle's assaults upon Bentham and James Mill with the vacuous cleverness of Macaulay's attempts in the same direction in the *Edinburgh Review*.

What are the main objections which have since been urged against utilitarianism—objections under the stress of which that system has been rendered obsolete for most of us, and transformed beyond identification by those who still give it a sort of adherence? That a motive is no independent force acting upon the will from outside, and that thus the analogy of a physical system which was once so freely invoked is lacking in its essential; that the picture of man forecasting more or less pleasurable states of himself and deciding either consciously or unconsciously in view of the algebraic surplus is an intellectualist caricature of real life; that even if "character" were simply the name for a mechanical aggregate of impulses not all of these can be called "desire for pleasure" as shown by the crucial instances of a soldier who dies for his country, a martyr who sacrifices himself for a principle, and in short every one who forgets calculation in an overmastering enthusiasm; that society cannot be resolved into a collection of units where one man's gain must be another man's loss and the happiness of the greatest number is thus merely the least of many evils, but that the unity is organic, and gain anywhere must, rightly considered, be gain for the whole; that, assuming as primitive a universal selfishness, no alchemy of logic can educe a universal benevolence—"From 'each for himself' to 'each for all' no road!";[51] that distinction in kind between pleasures cannot be reconciled with Mill's initial basis, but involves a criterion other than pleasingness, introduced simply because obligation could not without it be preserved. These are the commonplaces of later criticism, embodied in almost every modern ethical text-book, and, whatever their cogency, each of them was advanced in *Sartor,* in *Heroes,* in *Past and Present.* If they are there clothed in flowing eloquence, this fact, although it is apt to make the school philosopher distrustful, should not give their author a lower place than we assign to those who after a generation's reflection have reached precisely the same results, but have stated them with the canonical formality and the canonical dulness.

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[49] Essay on Self-Reliance.

[50] Cf. Doumic's *George Sand*, p. 143. "In a letter to Madame d'Agoult, George Sand tells that her gardener gave notice to leave, and on asking him his reason, the simple-minded man replied, 'Madame has such an ugly head that my wife who is expecting might die of fright.'"

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[51] Martineau, *Types of Ethical Theory.*

Again, Carlyle saw what was hidden from most in his time, that the real weakness of the empiricist school lay in its picture of the mind as wholly passive, and in its ignoring of the mental *spontaneities*. The stock in trade of Bentham's critics lay very generally in appeals to "the testimony of consciousness" as guaranteeing this or that principle which they valued but could not satisfactorily prove, and again in threats of unpleasant consequences for religion or morality if the basis in intuitions were given up. The obvious reply was that of Mill, that the alleged voice of consciousness had been arbitrarily reported, that if scientific laws had their root in experience religion and morality might be grounded in the same way, and that in any case the practical consequence of accepting a belief had no legitimate place in the discussion of its truth or falsity. Carlyle in not a few passages has suggested the far more telling attack with which we are now so familiar. He challenged the empirical psychology. He arraigned Bacon as having forgotten in his account of the procedure of science just that element which is most essential to its success, and of offering us only "better methods of labeling, of mixing, compounding and separating." The *novum organum* had affected so to mechanize the process that every man should become by the use of this improved instrument as good a reasoner as any other, just as a dwarf and a giant are equalized by the possession of firearms. Why not, if the machinery of the mind was just a passive sifter by *tabula praesentiae, tabula absentiae,* and *tabula graduum,* once the material is presented in experience? Who does not see here precisely the criticism to which Bacon's logical method has since been subjected, that it neglects the active element in mind, the sagacious bethinking oneself of an hypothesis? Still more impressive is Carlyle's insistence that a moral judgment is psychologically falsified if it is thought of as produced from without rather than from within. A striking passage in *The French Revolution* suggests that whole doctrine of values and valuing which is perhaps the most signal advance in the ethical thought of our own time:

> "For ours is a most fictile world; and man is the most fingent, plastic of creatures. A world not fixable; not fathomable! An unfathomable Somewhat, which is *not we*; which we can work with and live amidst—and mould miraculously in our miraculous being, and name World. But if the very rocks and rivers (as metaphysic teaches) are, in strict language, *made* by those outward senses of ours, how much more by the inward sense are all phenomena of the spiritual kind; dignities, authorities, holies, unholies! Which inward sense, moreover, is not permanent like the outward ones, but forever growing and changing."[52]

Again, Carlyle's constant polemic against the reduction of morality to a mode of individual feeling—a polemic which to the present writer seems still imperative—has to be understood with special reference to a certain moral degeneracy in the period that was immediately behind him. Diderot's *sensibilité*, and *âmes nobles,* were not peculiarly French. The moral-sense theorists of England stood in far closer relation than is generally observed—a relation pointed out with great acuteness by Coleridge[53]—to the moral spirit of their age. It was eighteenth-century sentimentalism that roused Carlyle's abhorrence. There was more than one side to that "enfranchisement of the passions" as Professor Dowden called it. It appeared in the emotionalism of the Wesleyan revival and in the philanthropy of Howard and Wilberforce. But it also appeared in *Tom Jones,* in *Tristram Shandy,* in *Humphrey Clinker,* in Schiller's *Robbers.* The reaction against Puritanic rigor had produced an apotheosis of impulse. Everything became forgivable to those who "could be touched by a delicate distress."[54] Carlyle saw clearly the ethical upshot of this tone of thinking. He saw that it was of quite subordinate importance whether we believe in Shaftesbury's "taste" or in More's "boniform faculty" or in the utilitarian "maximization of pleasures" or in any other doctrine which interprets the moral contrast as a struggle among various emotions for the dominance of the will. No striking of an average among such data of personal preference could escape the inherent subjectivity. Moreover, he discerned that in the grounding of morals upon objective reason lay the basis for a real metaphysic. Anti-metaphysician as at times he seemed to be, he was teaching metaphysicians much of their own business. Into how wretched a state that study had passed in Scotland at the date when *Signs of the Times* appeared, may be judged from the fact that the versatile and vivacious "Christopher North" was judged duly fitted to represent the subject in a chair at Edinburgh. Jeffrey was rejoicing that Dugald Stewart had proved the plain man to be in the right after all, so that metaphysics, now shown to be absurd, might henceforth be neglected. Stewart himself, having tried to read Kant in a Latin version, had given it up in despair, declaring his "utter inability to comprehend the author's meaning." At such a moment it was Carlyle who proclaimed that new era in speculation which every one has now come to acknowledge, who declared that though the old level of ontological discussion had disappeared a new level had revealed itself, and who kept imploring the official representatives of philosophy to acquaint themselves with that vital literature which was coming to them from the Continent. And though his own knowledge of German thought was somewhat amateurish, it was that of a brilliant amateur, from whom the professionals, by no means brilliant, had much to learn. The critique upon absolutism in *Characteristics* reads like a passage from William James. And *Sartor* is our evidence that for Carlyle the problem of personality had assumed that crucial character upon which no "personal idealist" could desire to improve.

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[52] *F. R.*, I, 2.

[53] In *Aids to Reflection.*

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[54] The phrase is borrowed from Dowden's *French Revolution and English Literature.*

But if Carlyle's strength lay in flashes of intuitive genius rather than in sustained and disciplined thought, a corresponding account must be given of his weakness. Much that he said of the futility of science must be allowed to have been mere wild and whirling words. Spencer hit the nail on the head when he complained that Carlyle spoke incessantly of the "laws of this universe" and our need to reverence them, but at the same time poured contempt on those who were patiently discovering what these laws are.[55] His contempt for logic was its own nemesis, when he laboriously built up a system to prove that systems are impossible. The idea underlying his famous description of metaphysics as disease was, of course, far from new, and in the enforcement of it he seems to have been the dupe of his own vivid rhetoric torturing a very partial analogy. That speculative restlessness is apt to beset an enfeebled will is one of the many morals which have, rightly or wrongly, been discerned in *Hamlet*. Hegel in a paragraph which every one knows by heart had spoken of the owl of Minerva as taking her flight when the shades of night begin to gather. And since Carlyle's time the same point, possibly borrowed from him, has been exuber-

[55] *Autobiography.*

antly worked by Nietzsche,[56] when he tells us that only a decadent age will evolve "problems," and that in estimating our debt to the Greek world we should place the virile self-confident Thucydides far higher than the brooding, hair-splitting Plato. The comment which at once suggests itself is that if an age has in one sense lost, it has in another and a better sense immensely gained by becoming aware of its own spiritual incoherence. And when Plato declared ὁ ἀνεξέταστος βίος οὐ βιωτὸς ἀνθρώπῳ, he said what all men like Carlyle would have done well to ponder. It is no doubt tempting to cherish a wistful regret for the perfection of the medieval synthesis between thought and life, although a too romantic spirit is apt to represent this harmony as far deeper than it was. It has been well pointed out that the best English thinkers in each period of the Middle Age itself looked back to some point still earlier as an uncorrupted past, and one may guess that at every such point the retrospect was delusive.[57] As George Meredith has remarked about the poetic idealizing of the circle of chivalry, this attitude may perhaps be encouraged for the pleasure of the imagination.[58] But even granting that the so-called times of faith were free from our modern restlessness, the inference is not that inquiry is at best an inevitable evil. Many of the things by which it is awakened may be evil, but in itself inquiry is an intrinsic good, and the evils which provoke it would not be less but greater if it were absent. Peace of mind comes either from rising above or from sinking below the problems that would disturb it, and surely Carlyle of all men should have been the last to suggest that the mere happiness of intellectual immaturity or intellectual stupor is not dearly bought. Nor does it seem to be really needful that growing reflection should bring with it an impairment of moral nerve. To take our author's own parallel from medicine, it may be that we should never have evolved physiology if we had not known a break-down in health. But does it follow that the better physiologists we are the more unhealthy we must become?

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[56] In *What I Owe to the Ancients.*

[57] Cf., e. g., G. G. Coulton, *Chaucer and his England,* Chap. I.

[58] Cf. *The Egoist.*

Again we may regret that the reaction against "profit-and-loss morality" should have made Carlyle so ***uncritical*** an intuitionist, should have blinded him to the need for forecasting results of action, should have led him into his absurd tirade against the reformatory and deterrent view of penal justice,[59] should have prevented him from distinguishing between casuistry that is honest and casuistry that is dishonest. And Julia Wedgwood has well complained that in him the immense portent of Darwinism—the whole transforming movement of thought that had gone so far even while he yet lived—aroused neither enthusiasm nor hostility. For Carlyle evolution was simply as if it had never been. But perhaps his strangest feature of all, one by which some of his other inconsistencies are to be explained, was his lifelong acknowledgment of discipleship to a writer whose creed fundamentally contradicted his own. Few pictures from literary history are more impressive than that of the raw Scottish lad wandering over the moors of Dumfriesshire with his precious copy of *Faust,* and declaring to himself that this poet, almost unknown to Englishmen, had a far wider range and a far fuller note than all the Byrons and Scotts over whom London *salons* had gone mad. It was a case of deep calling unto deep. But once he had taken it upon himself to introduce Goethe to the English-speaking world, Carlyle seems to have forgotten all the obligations of a critic in the zeal of a devotee. A very little of that healthy questioning which he applied, for example, to every work of

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[59] In *Latter-Day Pamphlets* ("Model Prisons").

Diderot or Voltaire would have shown him what a difference there was between the spirit of *Faust* and the spirit of *Sartor*.

Whatever else Goethe may be called, we can in no sense call him a Puritan, yet Puritan was the one single name that fitted Carlyle. That the irreducible contrast of right and wrong should be the basis for a cosmic reconstruction was as far as anything could be from the genteel doctrine of *nil admirari*, the superiority to all enthusiasms, art for art's sake, and impartial hospitality to all experiences in a completely rounded life. Cromwell and Knox would assuredly have felt that they had a strange colleague in Carlyle's gallery of heroes. They would have asked what they had in common with one whose interest was to show that the things they loved and the things they hated were alike essential to the harmony of the Whole, and they would have thought it doubly strange that they should have been placed together by a critic who held that not only truth but the beginning of all truths lay in holy intolerance of the evil by the good. Voltaire's noble stand for Calas was a far better proof of kinship with such company. Yet to Carlyle Voltaire was the prince of *persiflage*! Hero worship surely never misled one's judgment further than when a worshiper could see in Newman and Keble only the hollow phrases of formalism, but thought he heard organ notes of moral regeneration pealing from Weimar.

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THE PHILOSOPHY OF LOGICAL ATOMISM.

V. GENERAL PROPOSITIONS AND EXISTENCE.

I AM going to speak to-day about general propositions and existence. The two subjects really belong together; they are the same topic, although it might not have seemed so at the first glance. The propositions and facts that I have been talking about hitherto have all been such as involved only perfectly definite particulars, or relations, or qualities, or things of that sort, never involved the sort of indefinite things one alludes to by such words as "all," "some," "a," "any," and it is propositions and facts of that sort that I am coming on to to-day.

Really all the propositions of the sort that I mean to talk of to-day collect themselves into two groups—the first that are about "all," and the second that are about "some." These two sorts belong together; they are each other's negations. If you say, for instance, "All men are mortal," that is the negative of "Some men are not mortal." In regard to general propositions, the distinction of affirmative and negative is arbitrary. Whether you are going to regard the propositions about "all" as the affirmative ones and the propositions about "some" as the negative ones, or *vice versa,* is purely a matter of taste. For example, if I say "I met no one as I came along," that, on the face of it, you would think is a negative proposition. Of course, that is really a proposition about "all," i. e., "All men are among those whom I did not meet." If, on the other hand, I say "I met a man as I came along," that would strike you as affirmative, whereas it is the negative of "All men are among those I did not meet as I came along." If you consider such propositions as "All men are mortal" and "Some men are not mortal," you might say it was more natural to take the general propositions as the affirmative and the existence-propositions as the negative, but, simply because it is quite arbitrary which one is to choose, it is better to forget these words and to speak only of general propositions and propositions asserting existence. All general propositions deny the existence of something or other. If you say "All men are mortal," that denies the existence of an immortal man, and so on.

I want to say emphatically that general propositions are to be interpreted as not involving existence. When I say, for instance, "All Greeks are men," I do not want you to suppose that that implies that there are Greeks. It is to be considered emphatically as not implying that. That would have to be added as a separate proposition. If you want to interpret it in that sense, you will have to add the further statement "and there are Greeks." That is for purposes of practical convenience. If you include the fact that there are Greeks, you are rolling two propositions into one, and it causes unnecessary confusion in your logic, because the sorts of propositions that you want are those that do assert the existence of something and general propositions which do not assert existence. If it happened that there were no Greeks, both the proposition that "All Greeks are men" and the proposition that "No Greeks are men" would be true. The proposition "No Greeks are men" is, of course, the proposition "All Greeks are not-men." Both propositions will be true simultaneously if it happens that there are no Greeks. All statements about all the members of a class that has no members are true, because the contradictory of any general statement does assert existence and is therefore false in this case. This notion, of course, of general propositions not involving existence is one which is not in the traditional doctrine of the syllogism. In the traditional doctrine of the syllogism, it was assumed that when you have such a statement as "All Greeks are men," that implies that there are Greeks, and this produced fallacies. For instance, "All chimeras are animals, and all chimeras breathe flame, therefore some animals breathe flame." This is a syllogism in Darapti, but that mood of the syllogism is fallacious, as this instance shows. That was a point, by the way, which had a certain historical interest, because it impeded Leibniz in his attempts to construct a mathematical logic. He was always engaged in trying to construct such a mathematical logic as we have now, or rather such a one as Boole constructed, and he was always failing because of his respect for Aristotle. Whenever he invented a really good system, as he did several times, it always brought out that such moods as Darapti are fallacious. If you say "All A is B and all A is C, therefore some B is C"—if you say this you incur a fallacy, but he could not bring himself to believe that it was fallacious, so he began again. That shows you that you should not have too much respect for distinguished men.[1]

Now when you come to ask what really is asserted in a general proposition, such as "All Greeks are men" for instance, you find that what is asserted is the truth of all values of what I call a propositional function. A ***propositional function*** is simply ***any expression containing an undetermined constituent, or several undetermined constituents, and becoming a proposition as soon as the undetermined constituents are determined.*** If I say "x is a man" or "n is a number," that is a propositional function; so is any formula of algebra, say $(x+y)(x-y) = x^2-y^2$. A propositional function is nothing, but, like most of the things one wants to talk about in logic, it does not lose its importance through that fact. The only thing really that you can do with a propositional function is to assert either that it is always true, or that it is sometimes true, or that it is never true. If you take:

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[1] Cf. Couturat, *La logique de Leibniz.*

"If x is a man, x is mortal,"

that is always true (just as much when x is not a man as when x is a man); if you take:

"x is a man,"

that is sometimes true; if you take:

"x is a unicorn,"

that is never true.

One may call a propositional function

necessary, when it is always true;
possible, when it is sometimes true;
impossible, when it is never true.

Much false philosophy has arisen out of confusing propositional functions and propositions. There is a great deal in ordinary traditional philosophy which consists simply in attributing to propositions the predicates which only apply to propositional functions, and, still worse, sometimes in attributing to individuals predicates which merely apply to propositional functions. This case of *necessary, possible, impossible,* is a case in point. In all traditional philosophy there comes a heading of "modality," which discusses *necessary, possible,* and *impossible* as properties of propositions, whereas in fact they are properties of propositional functions. Propositions are only true or false.

If you take "x is x," that is a propositional function which is true whatever "x" may be, i. e., a necessary propositional function. If you take "x is a man," that is a possible one. If you take "x is a unicorn," that is an impossible one.

Propositions can only be true or false, but propositional functions have these three possibilities. It is important, I think, to realize that the whole doctrine of modality only applies to propositional functions, not to propositions.

Propositional functions are involved in ordinary language in a great many cases where one does not usually realize them. In such a statement as "I met a man," you can understand my statement perfectly well without knowing whom I met, and the actual person is not a constituent of the proposition. You are really asserting there that a certain propositional function is sometimes true, namely the propositional function "I met x and x is human." There is at least one value of x for which that is true, and that therefore is a possible propositional function. Whenever you get such words as "a," "some," "all," "every," it is always a mark of the presence of a propositional function, so that these things are not, so to speak, remote or recondite: they are obvious and familiar.

A propositional function comes in again in such a statement as "Socrates is mortal," because "to be mortal" means "to die at some time or other." You mean there is a time at which Socrates dies, and that again involves a propositional function, namely, that "t is a time, and Socrates dies at t" is possible. If you say "Socrates is immortal," that also will involve a propositional function. That means that "If t is any time whatever, Socrates is alive at time t," if we take immortality as involving existence throughout the whole of the past as well as throughout the whole of the future. But if we take immortality as only involving existence throughout the whole of the future, the interpretation of "Socrates is immortal" becomes more complete, viz., "There is a time t, such that if t' is any time later than t, Socrates is alive at t'." Thus when you come to write out properly what one means by a great many ordinary statements, it turns out a little complicated. "Socrates is mortal" and "Socrates is immortal" are not each other's contradictories, because they both imply that Socrates exists in time, otherwise he would not be either mortal or immortal. One says, "There is a time at which he dies," and the other says, "Whatever time you take, he is alive at that time," whereas the contradictory of "Socrates is mortal" would be true if there is not a time at which he lives.

An undetermined constituent in a propositional function is called a *variable*.

Existence. When you take any propositional function and assert of it that it is possible, that it is sometimes true, that gives you the fundamental meaning of "existence." You may express it by saying that there is at least one value of x for which that propositional function is true. Take "x is a man," there is at least one value of x for which this is true. That is what one means by saying that "There are men," or that "Men exist." Existence is essentially a property of a propositional function. It means that that propositional function is true in at least one instance. If you say "There are unicorns," that will mean that "There is an x, such that x is a unicorn." That is written in phrasing which is unduly approximated to ordinary language, but the proper way to put it would be "(x is a unicorn) is possible." We have got to have some idea that we do not define, and one takes the idea of "always true," or of "sometimes true," as one's undefined idea in this matter, and then you can define the other one as the negative of that. In some ways it is better to take them both as undefined, for reasons which I shall not go into at present. It will be out of this notion of *sometimes*, which is the same as the notion of *possible*, that we get the notion of existence. To say that unicorns exist is simply to say that "(x is a unicorn) is possible."

It is perfectly clear that when you say "Unicorns exist," you are not saying anything that would apply to any unicorns there might happen to be, because as a matter of fact there are not any, and therefore if what you say had any application to the actual individuals, it could not possibly be significant unless it were true. You can consider the proposition "Unicorns exist" and can see that it is false. It is not nonsense. Of course, if the proposition went through the general conception of the unicorn to the individual, it could not be even significant unless there were unicorns. Therefore when you say "Unicorns exist," you are not saying anything about any individual things, and the same applies when you say "Men exist." If you say that "Men exist, and Socrates is a man, therefore Socrates exists," that is exactly the same sort of fallacy as it would be if you said "Men are numerous, Socrates is a man, therefore Socrates is numerous," because existence is a predicate of a propositional function, or derivatively of a class. When you say of a propositional function that it is numerous, you will mean that there are several values of x that will satisfy it, that there are more than one; or, if you like to take "numerous" in a larger sense, more than ten, more than twenty, or whatever number you think fitting. If x, y, and z all satisfy a propositional function, you may say that that proposition is numerous, but x, y, and z severally are not numerous. Exactly the same applies to existence, that is to say that the actual things that there are in the world do not exist, or, at least, that is putting it too strongly, because that is utter nonsense. To say that they do not exist is strictly nonsense, but to say that they do exist is also strictly nonsense.

It is of propositional functions that you can assert or deny existence. You must not run away with the idea that this entails consequences that it does not entail. If I say "The things that there are in the world exist," that is a perfectly correct statement, because I am there saying something about a certain class of things; I say it in the same sense in which I say "Men exist." But I must not go on to "This is a thing in the world, and therefore this exists." It is there the fallacy comes in, and it is simply, as you see, a fallacy of transferring to the individual that satisfies a propositional function a predicate which only applies to a propositional function. You can see this in various ways. For instance, you sometimes know the truth of an existence-proposition without knowing any instance of it. You know that there are people in Timbuctoo, but I doubt if any of you could give me an instance of one. Therefore you clearly can know existence-propositions without knowing any individual that makes them true. Existence-propositions do not say anything about the actual individual but only about the class or function.

It is exceedingly difficult to make this point clear as long as one adheres to ordinary language, because ordinary language is rooted in a certain feeling about logic, a certain feeling that our primeval ancestors had, and as long as you keep to ordinary language you find it very difficult to get away from the bias which is imposed upon you by language. When I say, e. g., "There is an x such that x is a man," that is not the sort of phrase one would like to use. "There is an x" is meaningless. What is "an x" anyhow? There is not such a thing. The only way you can really state it correctly is by inventing a new language *ad hoc,* and making the statement apply straight off to "x is a man," as when one says "(x is a man) is possible," or invent a special symbol for the statement that "x is a man" is sometimes true.

I have dwelt on this point because it really is of very fundamental importance. I shall come back to existence in my next lecture: existence as it applies to descriptions, which is a slightly more complicated case than I am discussing here. I think an almost unbelievable amount of false philosophy has arisen through not realizing what "existence" means.

As I was saying a moment ago, a propositional function in itself is nothing: it is merely a schema. Therefore in the inventory of the world, which is what I am trying to get at, one comes to the question, What is there really in the world that corresponds with these things? Of course, it is clear that we have general *propositions,* in the same sense in which we have atomic propositions. For the moment I will include existence-propositions with general propositions. We have such propositions as "All men are mortal" and "Some men are Greeks." But you have not only such *propositions*; you have also such *facts,* and that, of course, is where you get back to the inventory of the world: that, in addition to particular facts, which I have been talking about in previous lectures, there are also general facts and existence-facts, that is to say, there are not merely *propositions* of that sort but also *facts* of that sort. That is rather an important point to realize. You cannot ever arrive at a general fact by inference from particular facts, however numerous. The old plan of complete induction, which used to occur in books, which was always supposed to be quite safe and easy as opposed to ordinary induction, that plan of complete induction, unless it is accompanied by at least one general proposition, will not yield you the result that you want. Suppose, for example, that you wish to prove in that way that "All men are mortal," you are supposed to proceed by complete induction, and say "A is a man that is mortal," "B is a man that is mortal," "C is a man that is mortal," and so on until you finish. You will not be able, in that way, to arrive at the proposition "All men are mortal" unless you know when you have finished. That is to say that, in order to arrive by this road at the general proposition "All men are mortal," you must already have the general proposition "All men are among those I have enumerated." You never can arrive at a general proposition by inference from particular propositions alone. You will always have to have at least one general proposition in your premises. That illustrates, I think, various points. One, which is epistemological, is that if there is, as there seems to be, knowledge of general propositions, then there must be *primitive* knowledge of general propositions (I mean by that, knowledge of general propositions which is not obtained by inference), because if you can never infer a general proposition except from premises of which one at least is general, it is clear that you can never have knowledge of such propositions by inference unless there is knowledge of some general propositions which is not by inference. I think that the sort of way such knowledge—or rather the belief that we have such knowledge—comes into ordinary life is probably very odd. I mean to say that we do habitually assume general propositions which are exceedingly doubtful; as, for instance, one might, if one were counting up the people in this room, assume that one could see all of them, which is a general proposition, and very doubtful as there may be people under the tables. But, apart from that sort of thing, you do have in any empirical verification of general propositions some kind of assumption that amounts to this, that what you do not see is not there. Of course, you would not put it so strongly as that, but you would assume that, with certain limitations and certain qualifications, if a thing does not appear to your senses, it is not there. That is a general proposition, and it is only through such propositions that you arrive at the ordinary empirical results that one obtains in ordinary ways. If you take a census of the country, for instance, you assume that the people you do not see are not there, provided you search properly and carefully, otherwise your census might be wrong. It is some assumption of that sort which would underlie what seems purely empirical. You could not prove empirically that what you do not perceive is not there, because an empirical proof would consist in perceiving, and by hypothesis you do not perceive it, so that any proposition of that sort, if it is accepted, has to be accepted on its own evidence. I only take that as an illustration. There are many other illustrations one could take of the sort of propositions that are commonly assumed, many of them with very little justification.

I come now to a question which concerns logic more nearly, namely, the reasons for supposing that there are general facts as well as general propositions. When we were discussing molecular propositions I threw doubt upon the supposition that there are molecular facts, but I do not think one can doubt that there are general facts. It is perfectly clear, I think, that when you have enumerated all the atomic facts in the world, it is a further fact about the world that those are all the atomic facts there are about the world, and that is just as much an objective fact about the world as any of them are. It is clear, I think, that you must admit general facts as distinct from and over and above particular facts. The same thing applies to "All men are mortal." When you have taken all the particular men that there are, and found each one of them severally to be mortal, it is definitely a new fact that all men are mortal; how new a fact, appears from what I said a moment ago, that it could not be inferred from the mortality of the several men that there are in the world. Of course, it is not so difficult to admit what I might call existence-facts—such facts as "There are men," "There are sheep," and so on. Those, I think, you will readily admit as separate and distinct facts over and above the atomic facts I spoke of before. Those facts have got to come into the inventory of the world, and in that way propositional functions come in as involved in the study of general facts. I do not profess to know what the right analysis of general facts is. It is an exceedingly difficult question, and one which I should very much like to see studied. I am sure that, although the convenient technical treatment is by means of propositional functions, that is not the whole of the right analysis. Beyond that I cannot go.

There is one point about whether there are molecular facts. I think I mentioned, when I was saying that I did not think there were disjunctive facts, that a certain difficulty does arise in regard to general facts. Take "All men are mortal." That means:

"'x is a man' implies
'x is a mortal' whatever
x may be."

You can see at once that it is a hypothetical proposition. It does not imply that there are any men, nor who are men, and who are not; it simply says that if you have anything which is a man, that thing is mortal. As Mr. Bradley has pointed out in the second chapter of his *Principles of Logic*, "Trespassers will be prosecuted" may be true even if no one trespasses, since it means merely that, *if* any one trespasses, he will be prosecuted. It comes down to this that

"'x is a man' implies 'x is a mortal'
is always true,"

is a fact. It is perhaps a little difficult to see how that can be true if one is going to say that "'Socrates is a man' implies 'Socrates is a mortal'" is not itself a fact, which is what I suggested when I was discussing disjunctive facts. I do not feel sure that you could not get round that difficulty. I only suggest it as a point which should be considered when one is denying that there are molecular facts, since, if it cannot be got round, we shall have to admit molecular facts.

Now I want to come to the subject of *completely general* propositions and propositional functions. By those I mean propositions and propositional functions that contain only variables and nothing else at all. This covers the whole of logic. Every logical proposition consists wholly and solely of variables, though it is not true that every proposition consisting wholly and solely of variables is logical. You can consider stages of generalizations as, e. g.,

"Socrates loves Plato"
"x loves Plato"
"x loves y"
"x R y."

There you have been going through a process of successive generalization. When you have got to xRy, you have got a schema consisting only of variables, containing no constants at all, the pure schema of dual relations, and it is clear that any proposition which expresses a dual relation can be derived from xRy by assigning values to x and R and y. So that that is, as you might say, the pure form of all those propositions. I mean by the form of a proposition that which you get when for every single one of its constituents you substitute a variable. If you want a different definition of the form of a proposition, you might be inclined to define it as the class of all those propositions that you can obtain from a given one by substituting other constituents for one or more of the constituents the proposition contains. E. g., in "Socrates loves Plato," you can substitute somebody else for Socrates, somebody else for Plato, and some other verb for "loves." In that way there are a certain number of propositions which you can derive from the proposition "Socrates loves Plato," by replacing the constituents of that proposition by other constituents, so that you have there a certain class of propositions, and those propositions all have a certain form, and one can, if one likes, say that the form they all have is the class consisting of all of them. That is rather a provisional definition, because as a matter of fact, the idea of form is more fundamental than the idea of class. I should not suggest that as a really good definition, but it will do provisionally to explain the sort of thing one means by the form of a proposition. The form of a proposition is that which is in common between any two propositions of which the one can be obtained from the other by substituting other constituents for the original ones. When you have got down to those formulas that contain only variables, like $x\mathrm{R}y$, you are on the way to the sort of thing that you can assert in logic.

To give an illustration, you know what I mean by the domain of a relation: I mean all the terms that have that relation to something. Suppose I say: "$x\mathrm{R}y$ implies that x belongs to the domain of R," that would be a proposition of logic and is one that contains only variables. You might think it contains such words as "belong" and "domain," but that is an error. It is only the habit of using ordinary language that makes those words appear. They are not really there. That is a proposition of pure logic. It does not mention any particular thing at all. This is to be understood as being asserted whatever x and R and y may be. All the statements of logic are of that sort.

It is not a very easy thing to see what are the constituents of a logical proposition. When one takes "Socrates loves Plato," "Socrates" is a constituent, "loves" is a constituent, and "Plato" is a constituent. Then you turn "Socrates" into x, "loves" into R, and "Plato" into y. x and R and y are nothing, and they are not constituents, so it seems as though all the propositions of logic were entirely devoid of constituents. I do not think that can quite be true. But then the only other thing you can seem to say is that the *form* is a constituent, that propositions of a certain form are always true: that *may* be the right analysis, though I very much doubt whether it is.

There is, however, just this to observe, viz., that the form of a proposition is never a constituent of that proposition itself. If you assert that "Socrates loves Plato," the form of that proposition is the form of the dual relation, but this is not a constituent of the proposition. If it were you would have to have that constituent related to the other constituents. You will make the form much too substantial if you think of it as really one of the things that have that form, so that the form of a proposition is certainly not a constituent of the proposition itself. Nevertheless it may possibly be a constituent of general statements about propositions that have that form, so I think it is *possible that* logical propositions might be interpreted as being about forms.

I can only say, in conclusion, as regards the constituents of logical propositions, that it is a problem which is rather new. There has not been much opportunity to consider it. I do not think any literature exists at all which deals with it in any way whatever, and it is an interesting problem.

I just want now to give you a few illustrations of propositions which can be expressed in the language of pure variables but are not propositions of logic. Among the propositions that are propositions of logic are included all the propositions of pure mathematics, all of which cannot only be expressed in logical terms but can also be deduced from the premises of logic, and therefore they are logical propositions. Apart from them there are many that can be expressed in logical terms, but cannot be proved from logic, and are certainly not propositions that form part of logic. Suppose you take such a proposition as: "There is at least one thing in the world." That is a proposition that you can express in logical terms. It will mean, if you like, that the propositional function "$x = x$" is a possible one. That is a proposition, therefore, that you can express in logical terms; but you cannot know from logic whether it is true or false. So far as you do know it, you know it empirically, because there might happen not to be a universe, and then it would not be true. It is merely an accident, so to speak, that there is a universe. The proposition that there are exactly 30,000 things in the world can also be expressed in purely logical terms, and is certainly not a proposition of logic but an empirical proposition (true or false), because a world containing more than 30,000 things and a world containing fewer than 30,000 things are both possible, so that if it happens that there are exactly 30,000 things, that is what one might call an accident and is not a proposition of logic. There are again two propositions that one is used to in mathematical logic, namely, the multiplicative axiom and the axiom of infinity. These also can be expressed in logical terms, but cannot be proved or disproved by logic. In regard to the axiom of infinity, the impossibility of logical proof or disproof may be taken as certain, but in the case of the multiplicative axiom, it is perhaps still open to some degree to doubt. Everything that is a proposition of logic has got to be in some sense or other like a tautology. It has got to be something that has some peculiar quality, which I do not know how to define, that belongs to logical propositions and not to others. Examples of typical logical propositions are:

> "If p implies q and q implies r, then p implies r."
>
> "If all a's are b's and all b's are c's, then all a's are c's.
>
> "If all a's are b's, and x is an a, then x is a b."

Those are propositions of logic. They have a certain peculiar quality which marks them out from other propositions and enables us to know them *a priori*. But what exactly that characteristic is, I am not able to tell you. Although it is a necessary characteristic of logical propositions that they should consist solely of variables, i. e., that they should assert the universal truth, or the sometimes-truth, of a propositional function consisting wholly of variables—although that is a necessary characteristic, it is not a sufficient one.

I am sorry that I have had to leave so many problems unsolved. I always have to make this apology, but the world really is rather puzzling and I cannot help it.

DISCUSSION.

........Is there any word you would substitute for "existence" which would give existence to individuals? Are you applying the word "existence" to two ideas, or do you deny that there are two ideas?

Mr. Russell: No, there is not an idea that will apply to individuals. As regards the actual things there are in the world, there is nothing at all you can say about them that in any way corresponds to this notion of existence. It is a sheer mistake to say that there is anything analogous to existence that you can say about them. You get into confusion through language, because it is a perfectly correct thing to say "All the things in the world exist," and it is so easy to pass from this to "This exists because it is a thing in the world." There is no sort of point in a predicate which could not conceivably be false. I mean, it is perfectly clear that, if there were such a thing as this existence of individuals that we talk of, it would be absolutely impossible for it not to apply, and that is the characteristic of a mistake.

VI. DESCRIPTIONS AND INCOMPLETE SYMBOLS.

I am proposing to deal this time with the subject of descriptions, and what I call "incomplete symbols," and the existence of described individuals. You will remember that last time I dealt with the existence of *kinds* of things, what you mean by saying "There are men" or "There are Greeks" or phrases of that sort, where you have an existence which may be plural. I am going to deal to-day with an existence which is asserted to be singular, such as "The man with the iron mask existed" or some phrase of that sort, where you have some object described by the phrase "The so-and-so" in the singular, and I want to discuss the analysis of propositions in which phrases of that kind occur.

There are, of course, a great many propositions very familiar in metaphysics which are of that sort: "I exist" or "God exists" or "Homer existed," and other such statements are always occurring in metaphysical discussions, and are, I think, treated in ordinary metaphysics in a way which embodies a simple logical mistake that we shall be concerned with to-day, the same sort of mistake that I spoke of last week in connection with the existence of kinds of things. One way of examining a proposition of that sort is to ask yourself what would happen if it were false. If you take such a proposition as "Romulus existed," probably most of us think that Romulus did not exist. It is obviously a perfectly significant statement, whether true or false, to say that Romulus existed. If Romulus himself entered into our statement, it would be plain that the statement that he did not exist would be nonsense, because you cannot have a constituent of a propositon which is nothing at all. Every constituent has got to be there as one of the things in the world, and therefore if Romulus himself entered into the propositions that he existed or that he did not exist, both these propositions could not only not be true, but could not be even significant, unless he existed. That is obviously not the case, and the first conclusion one draws is that, although it *looks* as if Romulus were a constituent of that proposition, that is really a mistake. Romulus does not occur in the proposition "Romulus did not exist."

Suppose you try to make out what you do mean by that proposition. You can take, say, all the things that Livy has to say about Romulus, all the properties he ascribes to him, including the only one probably that most of us remember, namely, the fact that he was called "Romulus." You can put all this together, and make a propositional function saying "x has such-and-such properties," the properties being those you find enumerated in Livy. There you have a propositional function, and when you say that Romulus did not exist you are simply saying that that propositional function is never true, that it is impossible in the sense I was explaining last time, i. e., that there is no value of x that makes it true. That reduces the non-existence of Romulus to the sort of non-existence I spoke of last time, where we had the non-existence of unicorns. But it is not a *complete* account of this kind of existence or non-existence, because there is one other way in which a described individual can fail to exist, and that is where the description applies to more than one person. You cannot, e. g., speak of "*The* inhabitant of London," not because there are none, but because there are so many.

You see, therefore, that this proposition "Romulus existed" or "Romulus did not exist" does introduce a propositional function, because the name "Romulus" is not really a name but a sort of truncated description. It stands for a person who did such-and-such things, who killed Remus, and founded Rome, and so on. It is short for that description; if you like, it is short for "the person who was called 'Romulus.'" If it were really a name, the question of existence could not arise, because a name has got to name something or it is not a name, and if there is no such person as Romulus there cannot be a name for that person who is not there, so that this single word "Romulus" is really a sort of truncated or telescoped description, and if you think of it as a name you will get into logical errors. When you realize that it is a description, you realize therefore that any proposition about Romulus really introduces the propositional function embodying the description, as (say) "x was called 'Romulus.'" That introduces you at once to a propositional function, and when you say "Romulus did not exist," you mean that this propositional function is not true for one value of x.

There are two sorts of descriptions, what one may call "ambiguous descriptions," when we speak of "*a* so-and-so," and what one may call "definite descriptions," when we speak of "*the* so-and-so" (in the singular). Instances are:

Ambiguous: A man, a dog, a pig, a Cabinet Minister.

Definite: The man with the iron mask.
The last person who came into this room.
The only Englishman who ever occupied the Papal See.
The number of the inhabitants of London.
The sum of 43 and 34.

(It is not necessary for a description that it should describe an individual: it may describe a predicate or a relation or anything else.)

It is phrases of that sort, definite descriptions, that I want to talk about to-day. I do not want to talk about ambiguous descriptions, as what there was to say about them was said last time.

I want you to realize that the question whether a phrase is a definite description turns only upon its form, not upon the question whether there is a definite individual so described. For instance, I should call "The inhabitant of London" a definite description, although it does not in fact describe any definite individual.

The first thing to realize about a definite description is that it is not a name. We will take "The author of *Waverley*." That is a definite description, and it is easy to see that it is not a name. A name is a simple symbol (i. e., a symbol which does not have any parts that are symbols), a simple symbol used to designate a certain particular or by extension an object which is not a particular but is treated for the moment as if it were, or is falsely believed to be a particular, such as a person. This sort of phrase, "The author of *Waverley*," is not a name because it is a complex symbol. It contains parts which *are* symbols. It contains four words, and the meanings of those four words are already fixed and they have fixed the meaning of "The author of *Waverley*" in the only sense in which that phrase does have any meaning. In that sense, its meaning is already determinate, i. e., there is nothing arbitrary or conventional about the meaning of that whole phrase, when the meanings of "the," "author," "of," and "*Waverley*" have already been fixed. In that respect, it differs from "Scott," because when you have fixed the meaning of all the other words in the language, you have done nothing toward fixing the meaning of the name "Scott." That is to say, if you understand the English language, you would understand the meaning of the phrase "The author of *Waverley*" if you had never heard it before, whereas you would not understand the meaning of "Scott" if you had never heard the word before because to know the meaning of a name is to know who it is applied to.

You sometimes find people speaking as if descriptive phrases were names, and you will find it suggested, e. g., that such a proposition as "Scott is the author of *Waverley*" really asserts that "Scott" and "the author of *Waverley*" are two names for the same person. That is an entire delusion; first of all, because "the author of *Waverley*" is not a name, and, secondly, because, as you can perfectly well see, if that were what is meant, the proposition would be one like "Scott is Sir Walter," and would not depend upon any fact except that the person in question was so called, because a name is what a man is called. As a matter of fact, Scott was the author of *Waverley* at a time when no one called him so, when no one knew whether he was or not, and the fact that he was the author was a physical fact, the fact that he sat down and wrote it with his own hand, which does not have anything to do with what he was called. It is in no way arbitrary. You cannot settle by any choice of nomenclature whether he is or is not to be the author of *Waverley,* because in actual fact he chose to write it and you cannot help yourself. That illustrates how "the author of *Waverley*" is quite a different thing from a name. You can prove this point very clearly by formal arguments. In "Scott is the author of *Waverley*" the "is," of course, expresses identity, i. e., the entity whose name is Scott is identical with the author of *Waverley.* But, when I say "Scott is mortal" this "is" is the "is" of predication, which is quite different from the "is" of identity. It is a mistake to interpret "Scott is mortal" as meaning "Scott is identical with one among mortals," because (among other reasons) you will not be able to say what "mortals" are except by means of the propositional function "x is mortal," which brings back the "is" of predication. You cannot reduce the "is" of predication to the other "is." But the "is" in "Scott is the author of *Waverley*" is the "is" of identity and not of predication.[1]

If you were to try to substitute for "the author of *Waverley*" in that proposition any name whatever, say "c," so that the proposition becomes "Scott is c," then if "c" is a name for anybody who is not Scott, that proposition would become false, while if, on the other hand, "*c*" is a name for Scott, then the proposition will become simply a tautology. It is at once obvious that if "*c*" were "Scott" itself, "Scott is Scott" is just a tautology. But if you take any other name which is just a name for Scott, then if the name is being used *as* a name and not as a description, the proposition will still be a tautology. For the name itself is merely a means of pointing to the thing, and does not occur in what you are asserting, so that if one thing has two names, you make exactly the same assertion whichever of the two names you use, provided they are really names and not truncated descriptions.

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[1] The confusion of these two meanings of "is" is essential to the Hegelian conception of identity-in-difference.

So there are only two alternatives. If "*c*" is a name, the proposition "Scott is *c*" is either false or tautologous. But the proposition "Scott is the author of *Waverley*" is neither, and therefore is not the same as any proposition of the form "Scott is *c*," where "*c*" is a name. That is another way of illustrating the fact that a description is quite a different thing from a name.

I should like to make clear what I was saying just now, that if you substitute another name in place of "Scott" which is also a name of the same individual, say, "Scott is Sir Walter," then "Scott" and "Sir Walter" are being used as names and not as descriptions, your proposition is strictly a tautology. If one asserts "Scott is Sir Walter," the way one would mean it would be that one was using the names as descriptions. One would mean that the person called "Scott" is the person called "Sir Walter," and "the person called 'Scott' " is a description, and so is "the person called 'Sir Walter.' " So that would not be a tautology. It would mean that the person called "Scott" is identical with the person called "Sir Walter." But if you are using both as names, the matter is quite different. You must observe that the name does not occur in that which you assert when you use the name. The name is merely that which is a means of expressing what it is you are trying to assert, and when I say "Scott wrote *Waverley*," the name "Scott" does not occur in the thing I am asserting. The thing I am asserting is about the person, not about the name. So if I say "Scott is Sir Walter," using these two names *as* names, neither "Scott" nor "Sir Walter" occurs in what I am asserting, but only the person who has these names, and thus what I am asserting is a pure tautology.

It is rather important to realize this about the two different uses of names or of any other symbols: the one when you are talking about the symbol and the other when you are using it *as* a symbol, as a means of talking about something else. Normally, if you talk about your dinner, you are not talking about the word "dinner" but about what you are going to eat, and that is a different thing altogether. The ordinary use of words is as a means of getting through to things, and when you are using words in that way the statement "Scott is Sir Walter" is a pure tautology, exactly on the same level as "Scott is Scott."

That brings me back to the point that when you take "Scott is the author of *Waverley*" and you substitute for "the author of *Waverley*" a name in the place of a description, you get necessarily either a tautology or a falsehood—a tautology if you substitute "Scott" or some other name for the same person, and a falsehood if you substitute anything else. But the proposition itself is neither a tautology nor a falsehood, and that shows you that the proposition "Scott is the author of *Waverley*" is a different proposition from any that can be obtained if you substitute a name in the place of "the author of *Waverley*." That conclusion is equally true of any other proposition in which the phrase "the author of *Waverley*" occurs. If you take any proposition in which that phrase occurs and substitute for that phrase a proper name, whether that name be

"Scott" or any other, you will get a different proposition. Generally speaking, if the name that you substitute is "Scott," your proposition, if it was true before will remain true, and if it was false before will remain false. But it is a *different* proposition. It is not *always* true that it will remain true or false, as may be seen by the example: "George IV wished to know if Scott was the author of *Waverley*." It is not true that George IV wished to know if Scott was Scott. So it is even the case that the truth or the falsehood of a proposition is sometimes changed when you substitute a name of an object for a description of the same object. But in any case it is always a different proposition when you substitute a name for a description.

Identity is a rather puzzling thing at first sight. When you say "Scott is the author of *Waverley*," you are half-tempted to think there are two people, one of whom is Scott and the other the author of *Waverley*, and they happen to be the same. That is obviously absurd, but that is the sort of way one is always tempted to deal with identity.

When I say "Scott is the author of *Waverley*" and that "is" expresses identity, the reason that identity can be asserted there truly and without tautology is just the fact that the one is a name and the other a description. Or they might both be descriptions. If I say "The author of *Waverley* is the author of *Marmion*," that, of course, asserts identity between two descriptions.

Now the next point that I want to make clear is that when a description (when I say "description" I mean, for the future, a *definite* description) occurs in a proposition, there is no constituent of that proposition corresponding to that description as a whole. In the true analysis of the proposition, the description is broken up and disappears. That is to say, when I say "Scott is the author of *Waverley*" it is a wrong analysis of that to suppose that you have there three constituents, "Scott," "is," and "the author of *Waverley*." That, of course, is the sort of way you might think of analyzing. You might admit that "the author of *Waverley*" was complex and could be further cut up, but you might think the proposition could be split into those three bits to begin with. That is an entire mistake. "The author of *Waverley*" is not a constituent of the proposition at all. There is no constituent really there corresponding to the descriptive phrase. I will try to prove that to you now.

The first and most obvious reason is that you can have significant propositions denying the existence of "the so-and-so." "The unicorn does not exist." "The greatest finite number does not exist." Propositions of that sort are perfectly significant, are perfectly sober, true, decent propositions, and that could not possibly be the case if the unicorn were a constituent of the proposition, because plainly it could not be a constituent as long as there were not any unicorns. Because the constituents of propositions, of course, are the same as the constituents of the corresponding facts, and since it is a fact that the unicorn does not exist, it is perfectly clear that the unicorn is not a constituent of that fact, because if there were any fact of which the unicorn was a constituent, there would be a unicorn, and it would not be true that it did not exist. That applies in this case of descriptions particularly. Now since it is possible for "the so-and-so" not to exist and yet for propositions in which "the so-and-so" occurs to be significant and even true, we must try to see what is meant by saying that the so-and-so does exist.

The occurrence of tense in verbs is an exceedingly annoying vulgarity due to our preoccupation with practical affairs. It would be much more agreeable if they had no tense, as I believe is the case in Chinese, but I do not know Chinese. You ought to be able to say "Socrates exists in the past," "Socrates exists in the present" or "Socrates is a description and not a name. If "God" were a name, no question as to existence could arise.

I have now defined what I mean by saying that a thing described exists. I have still to explain what I mean by saying that a thing described has a certain property. Supposing you want to say "The author of *Waverley* was human," that will be represented thus: "('x wrote *Waverley*' is equivalent to 'x is c' whatever x may be, and c is human) is possible with respect to c."

You will observe that what we gave before as the meaning of "The author of *Waverley* exists" is part of this proposition. It is part of any proposition in which "the author of *Waverley*" has what I call a "primary occurrence." When I speak of a "primary occurrence I mean that you are not having a proposition about the author of *Waverley* occurring as a part of some larger proposition, such as "I believe that the author of *Waverley* was human" or "I believe that the author of *Waverley* exists." When it is a primary occurrence, i. e., when the proposition concerning it is not just part of a larger proposition, the phrase which we defined as the meaning of "The author of *Waverley* exists" will be part of that proposition. If I say the author of *Waverley* was human, or a poet, or a Scotsman, or whatever I say about the author of *Waverley* in the way of a primary occurrence, always this statement of his existence is part of the proposition. In that sense all these propositions that I make about the author of *Waverley* imply that the author of *Waverley* exists. So that any statement in which a description has a primary occurrence implies that the object described exists. If I say "The present King of France is bald," that implies that the present King of France exists. If I say, "The present King of France has a fine head of hair," that also implies that the present King of France exists. Therefore unless you understand how a proposition containing a description is to be denied, you will come to the conclusion that it is not true either that the present King of France is bald or that he is not bald, because if you were to enumerate all the things that are bald you would not find him there, and if you were to enumerate all the things that are not bald, you would not find him there either. The only suggestion I have found for dealing with that on conventional lines is to suppose that he wears a wig. You can only avoid the hypothesis that he wears a wig by observing that the denial of the proposition "The present King of France is bald" will not be "The present King of France is not bald," if you mean by that "There is such a person as the King of France and that person is not bald." The reason of this is that when you state that the present King of France is bald you say "There is a *c* such that *c* is now King of France and *c* is bald" and the denial is not "There is a *c* such that *c* is now King of France and *c* is not bald." It is more complicated. It is: "Either there is not a *c* such that *c* is now King of France, or, if there is such a *c,* then *c* is not bald." Therefore you see that, if you want to deny the proposition "The present King of France is bald," you can do it by denying that he exists, instead of by denying that he is bald. In order to deny this statement that the present King of France is bald, which is a statement consisting of two parts, you can proceed by denying either part. You can deny the one part, which would lead you to suppose that the present King of France exists but is not bald, or the other part, which will lead you to the denial that the present King of France exists; and either of those two denials will lead you to the falsehood of the proposition "The present King of France is bald." When you say "Scott is human" there is no possibility of a double denial. The only way you can deny "Scott is human" is by saying

"Scott is not human." But where a descriptive phrase occurs, you do have the double possibility of denial.

It is of the utmost importance to realize that "the so-and-so" does not occur in the analysis of propositions in whose verbal expression it occurs, that when I say "The author of *Waverley* is human," "the author of *Waverley*" is not the subject of that proposition, in the sort of way that Scott would be if I said "Scott is human," using "Scott" as a name. I cannot emphasize sufficiently how important this point is, and how much error you get into metaphysics if you do not realize that when I say "The author of *Waverley* is human" that is not a proposition of the same form as "Scott is human." It does not contain a constituent "the author of *Waverley*." The importance of that is very great for many reasons, and one of them is this question of existence. As I pointed out to you last time, there is a vast amount of philosophy that rests upon the notion that existence is, so to speak, a property that you can attribute to things, and that the things that exist have the property of existence and the things that do not exist do not. That is rubbish, whether you take kinds of things, or individual things described. When I say, e. g., "Homer existed," I am meaning by "Homer" some description, say "the author of the Homeric poems," and I am asserting that those poems were written by one man, which is a very doubtful proposition; but if you could get hold of the actual person who did actually write those poems (supposing there was such a person), to say of him that he existed would be uttering nonsense, not a falsehood but nonsense, because it is only of persons described that it can be significantly said that they exist. Last time I pointed out the fallacy in saying "Men exist, Socrates is a man, therefore Socrates exists." When I say "Homer exists, this is Homer, therefore this exists," that is a fallacy of the same sort. It is an entire mistake to argue: "This is the author of the Homeric poems and the author of the Homeric poems exists, therefore this exists." It is only where a propositional function comes in that existence may be significantly asserted. You can assert "The so-and-so exists," meaning that there is just one *c* which has those properties, but when you get hold of a *c* that has them, you cannot say of this *c* that it exists, because that is nonsense: it is not false, but it has no meaning at all.

So the individuals that there are in the world do not exist, or rather it is nonsense to say that they exist and nonsense to say that they do not exist. It is not a thing you can say when you have named them, but only when you have described them. When you say "Homer exists," you mean "Homer" is a description which applies to something. A description when it is fully stated is always of the form "the so-and-so."

The sort of things that are like these descriptions in that they occur in words in a proposition, but are not in actual fact constituents of the proposition rightly analyzed, things of that sort I call "incomplete symbols." There are a great many sorts of incomplete symbols in logic, and they are sources of a great deal of confusion and false philosophy, because people get misled by grammar. You think that the proposition "Scott is mortal" and the proposition "The author of *Waverley* is mortal" are of the same form. You think that they are both simple propositions attributing a predicate to a subject. That is an entire delusion: one of them is (or rather might be) and one of them is not. These things, like "the author of *Waverley*," which I call incomplete symbols, are things that have absolutely no meaning whatsoever in isolation but merely acquire a meaning in a context. "Scott" taken as a name has a meaning all by itself. It stands for a certain person, and there it is. But "the author of *Waverley*" is not a name, and does not all by itself mean anything at all, because when it is rightly used in propositions, those propositions do not contain any constituent corresponding to it.

There are a great many other sorts of incomplete symbols besides descriptions. These are classes, which I shall speak of next time, and relations taken in extension, and so on. Such aggregations of symbols are really the same thing as what I call "logical fictions," and they embrace practically all the familiar objects of daily life: tables, chairs, Piccadilly, Socrates, and so on. Most of them are either classes, or series, or series of classes. In any case they are all incomplete symbols, i. e, they are aggregations that only have a meaning in use and do not have any meaning in themselves.

It is important, if you want to understand the analysis of the world, or the analysis of facts, or if you want to have any idea what there really is in the world, to realize how much of what there is in phraseology is of the nature of incomplete symbols. You can see that very easily in the case of "the author of *Waverley*" because "the author of *Waverley*" does not stand simply for Scott, nor for anything else. If it stood for Scott, "Scott is the author of *Waverley*" would be the same proposition as "Scott is Scott," which it is not, since George IV wished to know the truth of the one and did not wish to know the truth of the other. If "the author of *Waverley*" stood for anything other than Scott, "Scott is the author of *Waverley*" would be false, which it is not. Hence you have to conclude that "the author of *Waverley*" does not, in isolation, really stand for anything at all; and that is the characteristic of incomplete symbols.

[TO BE CONCLUDED.]

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THE DIVIDED SELF.

IN the inorganic world each combination of elements is at a stable equilibrium with definite qualities and relations. The organic world, however, seems to have a double equilibrium, some elements of survival being provided for by one mechanism and some by the other. Perhaps it would be better to say that the mechanism of survival has two poles; at each pole some of the functions of survival are carried on. When the surrounding temperature varies sometimes heat must be conserved while at other times an excess of heat makes more rapid radiation advantageous. This double set of conditions can be met only by some means of conserving heat and by some means of radiating it, each of which is dormant or active as the external conditions demand. A tree must meet the conditions of winter by evolving some protection against frost. In summer another group of mechanisms is needed by which growth is promoted. Evolution may be measured by this growth of double mechanisms, the higher organisms having greater power to make dormant or active their various mechanisms each of which promotes survival under particular conditions. More light or less light, more heat or less heat, more food or less food evoke or diminish activity even of the lowest forms of life; as the scale of living rises their importance increases. Mechanisms to conserve heat, light, and food must arise which arrest loss under conditions of deficit. Means must also be devised to prevent injury from an excess of light, heat or nutriment. Our major organic reactions relate to these simple facts. No theory of evolution is clarifying that does not show how this double set of conditions is turned to profit.

On the basis of these facts a contrast can be made between the mechanisms by which the conditions of deficit are met and those demanded by a condition of surplus. The problem of deficit is to reduce the waste of an organism more rapidly than the deficit increases and thus create a stable equilibrium at some point of minimum activity. Under a condition of surplus the waste of material must increase more rapidly than the increase of the surplus, thus ending in a new equilibrium where nutriment, energy, and activity are equal. Each surviving organism must have means of serving these ends, and its adaptability is greater and the type of organism higher as the distance between the two stable points increases. It is not difficult to separate the mechanisms that conserve under conditions of deficit from those evoked by conditions of surplus. The deficit mechanisms are those which lead to race survival while the surplus mechanisms are those which promote personal activity. The one insures the continuance of life, the other makes life worth living. The ultimate survival is thus not in the mechanically superior but in the undifferentiated who waste energy. What they do is less effective, but they can do more things and hence are more successful in meeting new conditions. Stable conditions thus promote specialization and economy. Variable conditions give an advantage to flexibility and waste.

The full force of this principle is not perceived until we recognize that the same contrast holds between the different parts of each animal that is true of contrasted organisms. Each being has specialized organs which guard it from deficit, and undifferentiated organs whose activity waste its surplus. Developed organs economize energy, but other undifferentiated parts waste the surplus the adjusted parts create. Energy at the deficit pole is used up making specialized mechanisms active while at the surplus pole it is a pulse that, passing through unspecialized organs, creates a great momentary effect but with no abiding result. Deficit energy thus creates adjustment while surplus energy is a temporary stimulus to forms of activity that are non-adjustive. This difference may be pictured by contrasting the energy used up in the specialized bodily organs with that which arouses brain action. The one produces measurable results; the other is visible in consciousness merely as emotion.

Brain activity is crude and wasteful in comparison with the specialized bodily organs and yet we regard it as the seat of our higher life. Why? The reason lies in the difference between energy that moves specialized mechanisms and that which affects us not through adjustive acts but as a pulse felt in consciousness as emotion. In addition to those useful for adjustment, surplus energy makes many embryonic mechanisms active. The flow of thought has thus injected into it elements which conflict with external reality.

Armed with this thought dreams get a new interpretation. They are not the partial working of completed mental mechanisms but mental activity in parts too imperfect to have an adjustive value. A dream is the striving of an organ to do what it cannot do. The impulse fails not because of external repression but because of internal organic defects. It is free from the restraints which nerve structure creates. A dream is the imperfect action of an undeveloped part lacking the completeness of perfect sensory reactions and has therefore the order of the caveman or of a still earlier type. It is their life, their ideas, and their gropings that are reflected, not those of the men of to-day. Could we fix the exact order in which conscious life became capable of perceiving ideas we would have the order of the dream world. It is this that gives sex imagery its control in dreams and makes sex facts color dream life. Was there not some stage in evolution when sex impulses represented the higher form of the then conscious life? If so, dreams are the result of an awakening of similarly undeveloped and unused parts of the brain. Repression of dream concepts would then be a normal event due to the flow of energy to the adjustive organs when they are called into activity. Day-dreaming and other products of the imagination are not the results of complete organs partly working but the vaguer workings of incomplete organs that have not the power to rise to the level of complete sensory activity. There is always the grasping for the unattainable, a mysterical order of events and a seeming objectivity which are normal products if the action is that of incomplete organic mechanisms. The abnormalities of conduct are caused by the belief that these vague visions are really of a higher order than the concepts of normal life. There is a justification of these higher values if the essential points of my argument stand criticism. The organically high on which our sense-impressions are based are merely deficit organs through which our adjustment is effected.

Sense-impressions reflect the stage of development of multi-cellular organisms who perform acts by means of definite structures. Earlier than this, corresponding to the amebic stage of development, consciousness is a pulse passing from point to point on a surface. Its physical manifestation would be a temporary arm like the projections of an ameba. It is here, there, and everywhere in turn but nowhere has it continuity. The pulse rises at a given point and then sinks back to reappear at some other point. Each rising wave is an embryonic self quickly to be replaced by another, equally fugitive. The lowest form of thought has thus all the inconsistencies which we find in dream life. There are slight flows in particular directions, then a break followed by a rise of a similar flow of thought under new conditions.

On its conscious side a pulse is a wish seeking fulfilment. Each amebic organ starts on a definite path but dies out with its wish unattained. Then the wish reappears in some slightly different form at some new point on the surface over which the pulse is passing, strives again for fulfilment and fails as before. There is thus a continuity in the series in the sense that a single wish is striving for fulfilment, but objectively considered they are a series of surface projections created by a passing pulse of energy. Primitive thought is tragic thought, for the wish in each of its forms fails; its revival in a new form leads to some new tragedy. The thought of objective continuity is foreign to the primitive thinker. He thinks of himself in the form which seems to lead to wish-fulfilment. But each endeavor comes to a tragic end and then some other form is assumed. All this is foreign to our way of thinking. To us the self is a permanent entity while the objects passing through consciousness seem to change. But if surplus energy in its earlier form was a pulse rising in consciousness as a wish then it is the wish and not the self which gives it its early unity. Self is a persistent wish and persistence can come only through some structural aid. When the amebic movements develop into structures the wish can persist in a fixed form and tend more fully to reach its fulfilment. The self is the subjective side of the structure in which the wish persists. Perhaps it is better to say that the wish becomes will when aided by structure, and what we call our self is our will personified. A primitive wish dies because it has not mechanism to aid fulfilment. Will is persistence and persistence demands inherited mechanisms which come only with subsequent evolution. An unstable self is thus the first self. Each such self dies, the wish appearing perennially in some new form.

In a grade higher than this dream world we have the beginning of stable conscious thought, yet with the same breaks which dream life discloses. This early form of thought we call reasoning by analogy. We start with some thought and cherish it for a time. When difficulties appear we substitute in its place some similar thought, think in its terms until difficulties arise, then a new transformation occurs accompanied by a new thought movement. That which persists through the series is not the identity of the object but of the wish which seeks fulfilment through the reasoning. Such is reasoning by analogy. A still higher form is what logicians call reasoning by substitution. Instead of one concrete thing being substituted for another, each substitution is more abstract than its predecessor and thus escapes some of the snares into which concrete thinking leads. The same wish, however, is back of the abstract form as it is behind the concrete expression. Trains of thought persist longer in its higher forms and have a better structural background. But thought is always tragic in any form which it has as yet attained. Somewhere there is a break and then it starts again under some new guise.

Such are the elements in tragic thought. It is the dominant form of thought even in the higher manifestations of conscious life. There is however another type of thinking in formation which may be called prophetic or idealistic thought. Here the end is visible but the means of reaching it is defective. There is in this the same futile effort to fill in the gaps between the wish and the end, a failure but a hopeful recovery in some new form. In this the wish has risen to the self, making it seem that the breaks are not in self but in objects about it. This prophetic thought becomes a philosophic thought when a defense of its premises is demanded, and is transformed into scientific thought when the will seeks to fill in the gaps which prevent wish-fulfilment. Back of all thought however is the wish which is a pulse of surplus energy, not an organic structure. The structure is our means of persistence, the biologic embodiment of primitive wishes. The will is not an ethereal something, but substantial bodily structure. It is wish objectified, not an entity dematerialized.

The basis of the dualism of mind is now apparent. Bodily mechanisms are designed either to conserve energy, or they tend to discharge surplus energy in ways to create a higher life. The conservative mechanisms come into play when a deficit is faced. Surplus energy expresses itself in emotion. Putting this contrast more concretely, the deficit mechanisms are our nerves. They become active when any danger to life is involved. In contrast to this the seat of the surplus mechanisms is in the blood. It is blood energy which starts our activity and thus drains the system of energy which undischarged would lead to physical abnormality. The nerves try to conserve, the blood tries to discharge. Between them an eternal conflict is on, the representatives of which in consciousness are fear and desire. Desire is wish striving for a fulfilment through the expenditure of energy. When controlled by fear we conserve the energy which wish domination would drain. We can therefore rightly speak of a nerve psychology and a blood psychology placing the two in opposition to each other. The seat of the one is in the nerves with fear as its conscious representative while blood surplus is the antecedent of the other with wish impulse as its consequence. Wishes are thus on their physical side surplus discharges which in their primary form are sexual. Only the better organized nerves have the power to check this expenditure of energy and thus to conserve life. We thus have the nerves prompted by fear acting against the expenditure of energy which crude wish mechanisms tend to promote. The presence of surplus nutriment starts the wish mechanisms while toxins in the blood irritate the nerves and thus create a flow of associated fears. Fears are trains of thought depressing activity while sex imagery denotes a discharge of some accumulated surplus. The play of fears and wishes thus gives an ever-varying content to thought, the source of which lies in blood transformations. Our mind reflects what the blood originates and its dualism has the same source.

This explanation resembles that of the Freudian psychologists with the difference that conscious phenomena are traced to their physical background instead of referring them to a mysterious subconsciousness. To me it is axiomatic that the content of consciousness is a reflection of the physical forces which underly it. No explanation is satisfactory which does not relate the content of consciousness to these antecedents. Sex yearning is the leading bodily tendency suppressed by the control of the central nervous system but it is only one of these suppressed tendencies. The action of the higher nerves is to change bodily activity from some part well supplied with surplus energy to some part more useful to the organism. If the drain of surplus from the naturally dominant part is not complete it escapes by indirect routes in spite of the repression exercised by the higher nerves. This is the cause of our dreams and by their analysis we can discover the source.

When an unobstructed flow of pure blood illumines the field of consciousness in a dream our elation takes a religious form and we interpret the content as a revelation. If the illumination is less brilliant we associate it with motion and hence think of the object as a bird or a horse. If the illumination is indistinct the figure becomes dangerous and fills the beholder with terror. This is the familiar nightmare. If still more imperfect, the form breaks up into lines and then the dreamer sees dragons or snakes. We thus get the background of our dreams out of the different degrees of illumination which the escaping energy projects into the field of consciousness. The blood throws on the screen a more or less distinct outline which we fill in by the associations which such figures arouse. The body of the picture expresses some dominant bodily tendency, but the detailed interpretation accords with our conscious memories. Intense illuminations interpreted as the sun, the hero, and the woman come from an overflow of sex energy. The bird and the horse are a reflex of muscular suppressions, while the bear and the snake are due to toxic obstructions in the blood. In each case there is a revolt and a discharge. During the revolt we dream; with the discharge we wake. The difference between the dreams of sex origin and those which are not is that in sex dreams the dreamer seems to be drawn by some irresistible force toward the object while in non-sexual dreams the object moves toward him. He is active and conquers in the first case while he is passive, subdued, or terrified in the other. This would seem to indicate that the blood was purer and the consciousness more intense in sex dreams while in the other type the blood contains a toxic element which is reflected in consciousness as fear. Bright figures seem to laugh while dark ones scowl. We yearn to approach the one and to avoid the other.

With this advantage we can face the hardest of biologic problems. Can a result influence its cause? This is the problem of the inheritance of acquired characters in a more general form. Those who try to show how somatic cells can influence germ cells have indeed a hard nut to crack, because they think of structure as an ultimate and not itself the result of more primitive forces. Structure is caused by energy pulses and to them we must look to find the link between somatic and germ cells. Pulses of energy are on their conscious side wishes. It is admitted that wishes can influence the growth of somatic cells. If we want a strong arm or leg and keep on exercising them in the end we will have strong arms and legs. Wishes can therefore influence structure making it more effective in wish-fulfilment. As soon as an organism begins to wish for structural change it begins. If this is granted the process by which cell structure is altered becomes apparent. It is not the structure which is inherited but the wish to do acts which demand structure. We are all familiar with the thought of inherited memories. These escape some of the difficulties which the inheritance of somatic structures cause but not all of them, for memory is itself structural. Inherited wishes avoid these difficulties since on their physical side they are pulses of energy and not organic structure. Can the wish of the parent arouse the same wish in the offspring? Yes, if the wish is a pulse of energy and not a structural product. The pulse which is wish in consciousness passes through the whole organism affecting every part to some degree. The child in the womb or the undischarged sex cell would be somewhat altered by the pulse, though doubtless in a less degree than the cells adjacent to the seat of consciousness. The child thus receives the impetus which the wish pulses aroused in the parent, but earlier in its existence than the parent received it. The wish begins to work in the child sooner than in the parent and thus in it affects a greater structural change than what occurred in the parent. In this way we would have a gradual change of structure in harmony with wishes without any direct inheritance of structure.

It is said that a child in its development passes through all of the stages through which its animal ancestors have gone. In each stage the penetrating wish forces a new growth which leads to some higher form of life before the maturity of the cell is attained. But this new growth is again affected by new wishes which, stopping growth in its natural direction, forces it to reform itself in some new way. The child never completes any of these stages because the wish element in its nature assumes new forms before any of its early structures gain enough maturity to stabilize themselves. All this is possible if wishes are on their physical side pulses of energy and not structure. Structure stabilizes energy, makes it move in particular directions but in the end it is the servant of energy and not its master.

These contentions may be regarded as mere theory but if we look in the right quarter supporting facts may be found. This can be done by contrasting wish structure with germ structure and showing what types of structure are in each class. Germ structure represents the tendencies which result from the constituents of the germ cell. Wish structure is the modification of this original bent due to wish pulses which pass through an organism or are transmitted by contact from parent to descendant. Wishes start as mere pulses of energy, but their movement from part to part modifies structure making its throbs correspond to those of the wish impulse. Living structure vibrates and grows through its vibrations. Wish pulses can modify these vibrations and thus influence structural growth. There is thus an antagonism between structure which cannot satisfy wishes and that which leads more fully to wish-fulfilment. These tendencies correspond to what we find in catabolic and anabolic structure. The anabolic conserves and thus tends to make growth correspond to the original tendencies which come from the germ cell. Catabolic structures get their impetus from the fresh energy coming from the outside. Anabolic structure is a defense against deficit conditions. It preserves against shock and hardship. Catabolic tendencies are primarily discharges of surplus energy. When changed into structure they increase the structural activity to the point where the surplus energy is used up. This activity is partly wish pulses, and thus the new structure permits wish-fulfilment to a greater degree than the older more static forms.

We thus get two selves, a self which seeks to conserve, and a self which strives to waste energy but in doing so creates new wish structure. The anabolic is the basis of race continuity. It sacrifices the personal to animal continuity. The wish, however, is personal and thus strives for a fuller expression of the present self. Its end is emotion, joy, and perfection. It sacrifices race ends to those of personal continuity. The conflict between the two is incessant and ever-increasing in violence. So great is this opposition that heredity finds it easier to separate them in two sexes than to continue unisexual organisms. In sex the two tendencies split and then reunite in the formation of new beings. The male thus represents wish structure while in the female the germ structure dominates. But every one is partly male and partly female and thus has in him or her the elements of opposition due to the presence of antagonistic structure. The difference is a problem of dominance and not of kind. The original sex was the female. The male beginning as a microbe has attained his dominance only by the increasing influence of wish on structure by which every structure is more or less changed from anabolic to catabolic forms. The man element even in women is ever growing more dominant.

In these differences between anabolic and catabolic tendencies we find the best evidence of the influence of wish pulses, but the clue once attained, other evidence is forthcoming. The various biologic transformations are examples of the same opposing forces. The wish creates structure and the wish structure is out of harmony with germ tendencies. Hence the germ tendencies try to repress the wish tendencies, with the result that we have the phenomenon of dominance and recession. Normally the wish yields and is suppressed. Germ structure is usually more powerful than wish pulses. Yet the wish pulse becoming structure gradually gains in effectiveness until we have the phenomenon of reduction and regeneration. Some static anabolic part is cast off and a new part formed more under the dominance of the wish pulses. Reduction and regeneration take place easily in the more elementary forms of life and it is here where the wish pulses have the greater influence.

They do, however, influence all impulses, even those we regard as spiritual. The religious enthusiast who has visions thinks they come from without, deeming their commands to be the voice of God. We can accept his evidence as to what happens but must reject his deductions as to how it happens. To get at its origin we must examine the content of the assumed revelation. What did the command tell him to do? Exactly what he has all along been wishing to do. The revelation never reveals anything new. It only repeats what millions of antecedent spirits have seen and hoped for. When Moses heard God's voice it told him to free his people. Can we suppose that he had lived in exile forty years and never thought of the deliverance of his race? We know enough of patriots in exile to realize that exile leads to an increase of race ardor. The voice therefore told Moses not something new but what he longed to hear. It gave him courage to do what he yearned to accomplish. A revelation is thus an intense personal wish objectified. No individual dreams of freeing his race unless his race has long striven for freedom. The prophet likewise is not told in dreams of some unknown vice to oppose. He is told to denounce what he has earnestly sought to counteract. What he has opposed, his race has for ages struggled against. The voice he hears is thus the voice of the ancestral wishes bubbling up within him. He strives to attain what they wanted but failed to accomplish. The growing race pulse creates visions so real that they appear objective. The objective, however, is not objective but merely the wish becoming more urgent than life.

If these acts are once understood a concept of evolution may be formed different from that for which Darwin stands sponsor. It assumes that germ cells vary and that these variations are the starting-point of evolution. The opposing concept of acquired characters broke down through the inability to show how changes in somatic structure modifies germ structure. But the same reasoning carried to its logical limit destroys not merely the evidence that somatic structure influences germ structure but also the evidence that germ structure tends to vary as Darwin assumed. The evidence that germ cells vary rests on the fact that descendants of the same parents differ. The Mendelian theory, however, shows the origin of these differences. It is doubtful if any variation is persistent enough to account for the rise of a new species. They may cause minor changes but not the greater ones on which race evolution depends.

To give an opposing theory a scientific basis the start must be made not in accidental variations but in the influence wish has on structure. If wish can modify structure the difficulties of the theory of acquired characters can be avoided. Wishes modify structure, but the new structure has no power to modify germ cell structure. It is the transmitted wish, not particles of the new structure which modify germ cell activity and hence modify germ structure. A wish is a pulse which appears earlier in the child than in the parent and hence exerts a greater influence. The wish structure of the child will thus be more effective than that of the parent and through its growth gains a dominance not possible under ancestral conditions. These opposing forces become anabolic and catabolic tendencies. Their antagonisms force reductions and regenerations which end in a metamorphosis or a mutation.

A mutation from this view-point is the result of an internal antagonism which ends in the casting off of some static part and its regeneration more in harmony with catabolic tendencies. A new species thus arises through a sudden splitting of the antecedent organism and not through a gradual variation in its germ cell. The causes are internal, recessive, and hence not observed until the split occurs and the accompanying regeneration reveals a new type of being. The seeming suddenness of the change is not sudden after all if we watch at the right spot for its manifestation. We must start with surplus energy and trace its gradual transformation into wish pulses and wish structure to get the key which unlocks the mysteries of organic evolution.

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PHILADELPHIA.

NOTES ON MAHAYANA BUDDHISM.

INTRODUCTION.

THE study of Mahayana Buddhism is essentially an interesting one, and this for two reasons. First, because, being as it is the religion of Thibet, China, and Japan, it holds the professed allegiance of about five hundred million people and may therefore be considered as having a larger number of adherents than any other religion. And secondly, and more especially, because of the interesting philosophy which it presents, possessing as it does so many similarities to Christianity, while at the same time teaching many doctrines which are only now beginning to attract the Western mind. Strange to say, however, in spite of all this, the Occident is but little acquainted with Mahayana. During the latter half of the nineteenth century much labor was spent by Orientalists in the editing and translating of the principal works of most of the religions and philosophies of the East, and owing to their diligence and care the Western mind has been enabled to obtain an excellent comprehension of the main modes of Oriental thought. Of Vedantism and the other so-called orthodox schools of Hindu thought, we have a working knowledge, and the same may be said of Hinayana or Theravada Buddhism, but of Mahayana Buddhism modern research has as yet only scratched the surface. Outside of a few out of the many thousands of Sutras, or sacred books which Mahayana reveres, and an occasional abstruse work on the subject, this interesting and influential religion is scarcely known to the Occidental world of to-day.

The Common Ground of Hinayana and Mahayana.—First of all, however, in entering into any discussion of Mahayanism, it is necessary to note something of the relations existing between that system and that form of the same faith which prevails to-day throughout Burma, Siam, and Ceylon and which is variously known as Hinayana or Theravada.[1] Speaking generally it may be said that Mahayana holds to everything that Hinayana teaches with the addition of numerous doctrines of its own. Both accept the fact that a Buddha or "enlightened sage" existed in India —though they differ widely as to his date, the Mahayanists putting it at approximately 1000 B. C., while the Hinayanists place it in the latter half of the seventh century B. C. On this point, at least, Hinayana is undoubtedly nearer the truth. Both agree upon the general details of the Buddha's life, and that his teachings offer a path of salvation for all mankind. Both accept the so-called Four Noble Truths, namely (i) that suffering exists, (ii) that the cause of suffering is wrong desire, (iii) that there is a possible end to suffering, namely the attainment of Nirvana through enlightenment, and (iv) that Nirvana may be gained by pursuing the Noble Eightfold Path consisting of (1) right comprehension, (2) right aspiration, (3) right speech, (4) right conduct, (5) right mode of livelihood, (6) right endeavor, (7) right self-discipline, and (8) right rapture. Both agree upon the doctrines of *anatman,* the idea that while the soul exists it is a combination of things and not a thing in itself, and of ***karma***, "as a man sows, so shall he reap," and of reincarnation.[2]

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[1] Mahayana signifies the "great vehicle" in contradistinction to Hinayana or "little vehicle" (of salvation). The latter is scarcely complimentary, and so its followers prefer the term Theravada, or teaching of the sages. It is, however, much less prevalent, and for that reason the other word will hereafter be used.

The Differences Between Hinayana and Mahayana.—Such, in brief, may be said to be the teachings of Hinayana, and of one phase of Mahayana Buddhism, but in addition to the above, Mahayana maintains the following doctrines which are either ignored or denied by its sister faith.

1. Mahayana teaches the existence of an Absolute, which in its ontological aspect is known as the Bhutatathata ("suchness of existence") and from the point of view of religious consciousness is termed the Dharmakaya,[3] the former the impersonal unmanifested God, the latter a personal (though of course not anthropomorphic) and manifested Deity.

2. According to Mahayana every Buddha is to be considered as becoming one in essence with the Dharmakaya, and that therefore his appearance upon earth may be looked upon as an incarnation or reflection of the Supreme.

3. Hinayana holds that personal salvation or Nirvanaship may be gained by all. Mahayana, however, while distinctly affirming this, declares it to be the privilege and duty of its followers to renounce this and to continue to come back to the transient world for the sake of saving all creatures—in other words to become a Buddha as well as an Arhat.

4. The greater part of the remaining differences between Mahayana and Hinayana may be said to be due to no small extent to the spirit of comprehensiveness of the former. Mahayana declares that all religions are revela-

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[2] For a description of the traditional life of the Buddha, see any standard work on Hinayana Buddhism, as also for a treatment of the above points from the Hinayana point of view, while for their elaboration from the point of view of Mahayana, see the following discussions.

[3] For the evolution and meaning of this word see the discussion in the following section (Mahayana Buddhism as Religion).

tions of the Dharmakaya, and therefore attempts to comprehend what it considers to be the best points of all.

Which Is the Genuine Teaching of the Buddha?—In this connection, of course, arises the question as to which of the two schools approaches more nearly the original teachings of the Buddha. The point is open to discussion, and there may be elements of truth on both sides. For the most part, however, Mahayana scholars admit that as far as what in the West would be called "dead-letterism" is concerned, Hinayana is nearer to the exact teaching of the Buddha, but they maintain that Mahayana has kept what might be termed the spirit even more intact, or in other words, that in aiming after the preservation of the letter, Hinayana has to a large extent lost sight of the spirit, and that therefore Mahayana should be regarded as the truest representative of the Buddha.

However that may be, it may be said that the researches of modern Occidental scholars into early Buddhism seem on the following points to have corroborated in a general way some of the claims of the Mahayanists as to the nature of the primitive faith.

1. Thus, for example, in the very earliest Sutras the distinction between the Buddha and those of his followers who had attained Nirvana seems to have been one of degree rather than that of kind, thus implying the modern Mahayana doctrine that Buddhahood may be aspired to by all, in contradistinction to the Hinayana doctrine that Buddhahood and Nirvanaship are two different and distinct things, the former and higher honor being limited to a certain select few.

2. Again, researches have shown that Buddhism in its early stages in common with all other great religions, was by no means the set and confined thing that it is to-day. Thus we see that the current gods, etc., of India, instead of being rigorously denied by the Buddha, were permitted

by him to be worshiped as long as they did not conflict with his own *dharma* or religion, thus foreshadowing the modern Mahayana conception of comprehensiveness.[4]

3. Nor can the principal other point on which Mahayana differs from Hinayana, namely on the question as to the existence of the Absolute, be considered altogether a corruption, since we find the same idea implicit in Hinayana, while some Hinayanists state it explicitly, though in a somewhat undeveloped form.[5]

I. MAHAYANA BUDDHISM AS PHILOSOPHY.

The Absolute.—As has already been noted, one of the most striking features of Mahayana Buddhism—the point on which it differs most radically from Hinayana, and approaches more nearly the Vedanta philosophy of India—is that regarding its conception of the Absolute. Mahayana is essentially monistic inasmuch as it teaches that all existence is but the manifestation of one substance, or if this term gives too materialistic an idea, of one Ultimate Reality. In that bewildering manner which is common to all Oriental philosophies, this Being has received innumerable names and titles, principal among which are: (1) Essence of Buddhas, as it constitutes the reason of Buddhahood; (2) Dharma,[6] when it is considered the norm or law of existence; (3) the Bodhi, when it is the source of intelligence; (4) Prajna (wisdom), when it intelligently directs the course of nature; (5) Paramartha, the highest truth; (6) Bhutakoti, when its ontological aspect is taken into consideration; (7) Tathagatagharba, the womb of the Tathagata (Buddha), when it is thought of in analogy to

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[4] On all questions pertaining to primitive Buddhism, a simple but comprehensive account will be found in *Early Buddhism* by Rhys Davids.

[5] *Vide* in this connection *Amitabha, a Story of Buddhist Theology*, by Dr. Paul Carus, for an account of the development of the idea of the Absolute in Buddhism.

[6] For an examination of the evolution of the word Dharma, see footnote 12 in the following section.

Mother Earth, where all the germs of life are stored—and so on indefinitely. The most common name given it, however, is that of Bhutatathata—Suchness of Existence, or simply Suchness.

The Two Realms of the Absolute.—Bhutatathata, or the Absolute, is regarded by the Mahayanists as having two states, the conditioned and the unconditioned, or to use the words of Açvaghosa, one of the patriarchs and chief authorities of Mahayana who flourished at about the time of Christ, the realm of Suchness proper, and the realm of Life and Death. The former is the unmanifested God, existing "before the beginning," the latter the soul of existence, the reality behind the universe, and life as it is to-day.[7]

In its former aspect, it is the undefinable, the incomprehensible—the unknowable of Herbert Spencer. It is the root of everything, and consequently it has infinite attributes. It corresponds very closely to the Primal One of Pythagoras, the One, not in contradistinction to the two and the three, but the One which includes all the other numbers. Mahayana, carrying out this idea of absoluteness, declares that it would be false to say that it exists or that it does not exist, since existence implies non-existence, and to call it one or the other would therefore limit its absoluteness. Many of the Western philosophers have, indeed, held similar conceptions of the Eternal, but few of them have carried the idea to the length that we find it carried in Mahayana, where we have Açvaghosa saying, "Thus we understand that Suchness (in its unconditioned phase) is neither existence nor non-existence, nor that which is at once existence and non-existence, nor that which is not at once existence and non-existence." In short it is infinite, in the widest sense of that word, and all-embracing, and as such is incapable of ordinary comprehension.

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[7] It will be noted that there is a striking resemblance between the ideas here set forth and those which have been formulated by some of the greatest of the modern Western philosophers, notably Spinoza, Berkeley, Kant, Fichte, Schelling, Hegel, etc., Mahayana having features corresponding strangely to certain portions of each one of these.

The Reason for Conditionment.—One of the points on which Mahayana, and for that matter all philosophy, is least satisfying, as it itself admits, is on the question as to why the absolute Suchness became the conditioned Suchness, the reason the unlimited should confine itself in the realm of Life and Death. Mahayanists, using the words of Açvaghosa, merely say that it came into being spontaneously, which as a matter of fact means little or nothing. Brahmanism affirms that Brahm willed to be two, and that such was the origin of the universe. Mahayana Buddhism does not explicitly state this, although perhaps it implies something very near this when it says that the Dharmakaya or the Bhutatathata is consciously guiding the course of evolution. This, however, but evades the question, since it must next be answered *why* the Bhutatathata willed to be two, and Mahayana is here almost entirely silent, although, indeed, a few of its more speculative thinkers have ventured to say that it did so in order to realize itself. In its absolute condition it can have little or no self-knowledge since there is nothing by which it can measure itself, and so in order to comprehend its own unlimitedness manifested the material world. Thus to the Buddhist, pre-particular Suchness is like a little child ignorant of the world and its ways. Particular Suchness is the man of the world battling with the odds of life. Post-particular Suchness is the man in his prime who has passed through that stage, and is pure, not through ignorance of impurity, as in childhood, but by having learned through experience how to withstand it. "Thus life will necessarily march onward to Buddhahood, actualizing in the course of its development the eternal in the transient, the omnipresent in the special, the universal in the concrete and particular, and unchangeable perfection in the imperfect haphazards of the kaleidoscopic world of changes."[8]

The Method of Conditionment.—But though according to the Mahayana, Suchness is unlimited, and therefore one (for duality would imply relativity as opposed to Absoluteness), yet, nevertheless, in order to explain the method of the manifestaion of the material universe, it is forced to declare that inherent in this unity there are two aspects, namely the aspect of enlightenment and the aspect of unenlightenment or ignorance, or to use more familiar verbiage, of matter and of spirit. According to Mahayana the whole of existence comes from the action of ignorance upon enlightenment, or the all-perceiving mind. Açvaghosa compares the method of creation to be like the action of the sea. The ocean is the all-perceiving mind (the *ideas* of Plato), ignorance is the wind (Plato's μὴ ὄν) and by the action of the wind upon the water, the waves or the material worlds appear. Hence Mahayana declares that absolute Suchness may be said to be in one sense the same as the world, and in another sense not the same, just as "the water can be said to be identical in one sense, and non-identical in another sense, with the waves. The waves are stirred up by the wind, but the water remains the same. When the wind ceases, the motions of the waves subside, but the water remains the same. Likewise when the mind of all creatures which in its own nature is pure and clean, is stirred up by the winds of ignorance, the waves of mentality appear. These things, however, have no absolute existence and are neither unity nor plurality."

Mahayana, then, may be said to occupy a middle position between those who affirm and those who deny the existence of the material universe. It affirms that it exists but denies that it has an absolute existence—that it is a thing in itself, maintaining as it does that it is but a manifestation of the Bhutatathata, just as the waves may be said to exist, yet not to have an absolute existence. The world is an illusion, says the Mahayanist, but as an illusion it must be said to be.

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[8] Paul Carus, Introduction to Açvaghosa's *Awakening of Faith in the Mahayana*, tr. by T. Suzuki.

Impermanence.—Mahayana Buddhism, and all science and philosophy for that matter, teaches that at any rate as far as the external world is concerned, everything is impermanent and subject to flux and change. There is no such thing, as far as our knowledge goes, in the material world which is a thing in itself, all things being but combinations or complex things. Thus, for example, we are all aware that there is no such thing as a stove or a table in itself, each being but a combination of parts, parts of sub-parts, sub-parts of molecules, molecules of atoms, atoms of electrons, and so on until we get back to the final ether, the only thing which may be said to have an absolute existence.[9] Now being a combination of other things and not a thing in itself, that stove or that table is bound sooner or later to destruction, for it is an axiom both of Buddhism and of science that only simple things are permanent, a complex thing being in its very nature bound to be dissolved, although this dissolution may be put off indefinitely.

Universal speculation has of course admitted this fact, but the Indian philosophers, and for the most part also the schools of the West, have made two important exceptions to this rule of flux, namely, first the devas, or in Christian verbiage the angels, and secondly the souls of men and women, and even (though this is denied by Christianity) those of animals and vegetables. Buddhism, however, both Hinayana and Mahayana, carries this idea of universal complexity and therefore of universal impermanency to its utmost length, and declares that even these are combinations and consequently subject to change. Not only do they exclaim with Heraclitus "No one can step twice into the same river," but they also hold that no two thoughts can be thought by the same man.[10]

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[9] It must be admitted that on the point of the existence of an absolute or thing in itself, Mahayana is more logical than its sister faith, Hinayana, which officially either ignores or rejects it. There must either be many absolutes (atoms), or one absolute (ether). Mahayana, then, is justified in holding that there is at least *on* absolute, and modern science would seem to confirm its assertion that there is *only one*, since the atom, which only a few years ago was universally regarded as indissoluble, has now been broken up.

Suffering and Sorrow.—Owing to its frank acceptance of this idea of impermanency, Buddhism is often accused of being pessimistic, but this (certainly as far as Mahayana is concerned) is only partially true. It is often claimed that Buddhism teaches that all life is suffering, but as a matter of fact, Buddhism only proclaims that the conditions which accompany life are also capable of producing sorrow. Thus, individuality is in itself no evil, but the conditions which make for individuality also make for death, disease, and poverty.

Buddhism, however, openly admits (as every one must) that there *is* suffering in the world. What household, says the Buddhist, is there which is free from death, sickness, or dishonor; what person who can say that his life has been made up of unalloyed joy—even among wealthy and noble families? Everywhere, he will point out, may one see misfortune and privation, everywhere is there disease and despair, practically everywhere do poverty and want prevail, and while it is an axiom that no condition is so bad but that it might be worse, yet all must agree that the present age, while in many respects far superior to any of which we have any knowledge, is nevertheless far from perfect—that while conditions might certainly be worse, they might certainly be better.

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[10] It would be a mistake to infer from this that Mahayana teaches that there is no such thing as immortality, for although immortality in the sense of eternal identity is denied, immortality in the sense of eternal continuity is universally affirmed. For a further and more detailed discussion of this perplexing problem of the persistence of the personality, which has proved such a stumbling-block to the vast majority of Occidental students of Buddhism, of both branches, see the discussion of Mahayana as Psychology in regard to the human soul, and the paragraph on the Devas or Gods in the discussion of Mahayana as Religion.

Nirvana.—So far, indeed, does Buddhism agree with the pessimists, but unlike pessimism, it is urgent in its proclamation that this sorrow may be ended; that there is a path which every one may tread and which will permit each one to rise superior to all adversity—namely, Nirvana.

This doctrine of Nirvana has been much misunderstood by Western critics of Buddhism. It was first of all considered to be equivalent to annihilation, though some argued that personal individuality remained after death and that Nirvana was a sort of heaven. As a matter of fact, Nirvana has a far wider significance than either of these conceptions. It means simply a mental attitude—a state of mind which can be attained here on earth. In other words, a man, after seeing the childishness of both the joys and the sorrows of ordinary earthly life, may rise superior to them, and by fixing his mind on things eternal, raise himself into a sort of religious ecstasy, which, notwithstanding that he goes about his every-day duties, will remain with him throughout life.

In Hinayana, fixing the mind on things eternal means merely seeing the worthlessness of material things, but in Mahayana it signifies, above all things, an understanding of and devotion to the Absolute. It is said that the Buddha in a former state of existence sacrificed his life to gain the stanza:

> "All component things are transient,
> The law is to be born and die.—
> Transcending birth and death,
> How blissful is the Absolute."

In other words, each one may share in this bliss of the Absolute even while on earth; when he has become identical with the universal norm, he realizes his universal presence in all things.[11]

Buddhahood.—Nirvana is the highest goal to which Hinayana teaches its followers to aspire, a state of personal happiness and salvation. It is more or less a question of each one for himself, and the devil take the hindmost. Mahayana, however, goes beyond this conception. It teaches indeed, that personal Nirvanaship may be, and often is, gained, but it also proclaims that it is possible for one who desires to do so, to renounce this personal bliss in order that he may continue in the world to help its inhabitants out of the misery and sorrow which are everywhere apparent. Such a one is in Buddhist phraseology a Bodhisattva. Every Bodhisattva, however, must finally reach the stage of perfect and supreme enlightenment, or Buddhahood, the highest honor to which any one may aspire. To the Buddhas everything is laid open, all the secrets of nature are unveiled, and what can only be believed in by ordinary humanity, is by a Buddha finally understood and realized. Unlike Hinayana, which, while teaching that the state of Buddhahood exists, holds that its attainment is limited to only a few persons, Mahayana proclaims that it can finally be reached by any one who sets his mind upon it, and teaches its followers to do so.

It must not be forgotten that Buddhahood, like Nirvana, is not a place of existence, but a state of mind which may be attained anywhere, both on earth or in any of the numerous heavens which Buddhism declares to exist. Buddhism is divided on the question as to whether or not the Buddhas continue to have a separate existence after their death, some of the sects and schools teaching that the Buddhas are absorbed into the Absolute, while others maintain that their individuality persists, and that in a more exalted sphere they continue to use their beneficent influence for humanity at large. It may be said that in Hinayana the former idea is more prevalent, while in Mahayana the latter conception has the greater number of adherents.

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[11] It will be obvious from this, that Buddhism, unlike certain schools of German pessimism, urgently discourages suicide, since it holds it to be worse than useless to attempt to overcome suffering in this way, the only really possible way, according to Buddhism, being through right rapture.

II. MAHAYANA BUDDHISM AS RELIGION.

Mahayana Really a Religion.—Buddhism is often spoken of as being more of a philosophy than a religion, and of Hinayana this may to no small extent be true, but of Mahayana such a statement would be but a gross misconception. Mahayana has, indeed, its speculative side, a portion of which we have already examined, but it prides itself on being thoroughly logical and rational. But Mahayana has in addition to this its religious and devotional aspect, and it may even be said that its importance depends more upon this than upon the other, since without it, Mahayana could scarcely hope to hold its influence upon the vast majority of its followers.

In its philosophical aspect, putting aside its acceptance of an Absolute, Mahayana comes very near to its sister faith, Hinayana, but under its religious aspect it approaches nearly as close to Hinduism, and indeed to Christianity, admitting as it does of a triune personal God, of angels, of innumerable heavens and hells, of a substitute for the Incarnation and Atonement, etc. It should not be supposed from this, however, that the religious and the philosophical sides of Mahayana are contradictory or incompatible, for they are in fact but supplementary. It is a fascinating study from every point of view to notice how by gradual development, Mahayana has been able to weld together a philosophical conception which has often been called materialistic, and which is certainly not very far removed from it, and a religious conception which alone would be confused with a system which has often been termed dogmatic and unscientific. Mahayanism is a reconciliation of opposites—a sort of missing link between two different conceptions, and all those numerous persons in the Occident who are struggling in the endeavor to reconcile religion and science would do well to note the results of an unconscious similar effort in the Orient.

The Dharmakaya.—Take for example the idea of God. What Bhutatathata signifies from the ontological point of view, the Dharmakaya (Body of the Law)[12] does from the standpoint of religious consciousness. The Dharmakaya may be looked upon as a sort of aspect or manifestation of the Bhutatathata, and with the Nirmanakaya and the Sambhogakaya forms the Buddhist trinity or Trikaya. Here again the analogy between Hinduism and Mahayana is complete, since Hinduism teaches, it is hardly necessary to say, that Brahm is the impersonal unmanifested God who afterwards becomes manifested in the Trimurti as Brahma, Vishnu, and Shiva.

This Dharmakaya is known under many names among the Buddhists of China and Japan, but principally as Vairochana Buddha, and Amitabha or Amitayur Buddha. This Dharmakaya is distinctly a personal deity as conceived by the Mahayanist, even of the more philosophical sects, and is regarded as controlling and guiding the destinies of the world, sharing, of course, the Christian deity's attributes of omnipresence and omniscience as well as omnipotence. Through the Bhutatathata, all the material universe is to be looked upon as a manifestation of Him, and in fact He may be looked upon as being the soul of the universe. He—or rather It, for Mahayana scholars reject with some asperity the use of the masculine pronoun in connection with the Supreme—is possessed of infinite love and wisdom, and apparently, through the possession of the *pranidhanabala* (the power of making vows or prayers) of a definite will and volition, although this side of Its nature is not as fully brought out or as explicitly stated. To quote the words of the *Atvamsaka Sutra,* "It is the One, devoid of all determinations. This body of Dharma has no boundary, no quarters, but it is embodied in all bodies. Though it is a treasury of intelligence, it is void of particularity. The universe becomes, but this body forever remains. It is free from all opposites and contraries, yet is working in all creatures to lead them to Nirvana."

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[12] Writing on the definition of the Dharmakaya, Suzuki (*loc. cit.*, p. 62, footnote) well says: "There seems to be a general misconception about the exact significance of the term *Dharmakaya* which constitutes the central point of the Mahayana system. Most Western Buddhist scholars render it the Body or Personality of the Law, understanding by law the doctrine of the Buddha. This may be correct in Southern Buddhism as well as in its historical sense, because after the Nirvana [death] of Buddha it was quite natural for his disciples to personify the doctrine of their teacher, as their now only living spiritual leader. But in the course of time it acquired an entirely different significance and ceased to mean the personification of the Doctrine. Now *dharma* does not only mean law or doctrine but also an individual object, an idea, a substance, or when it is used in its broadest sense, existence in general. *Kaya* means a body or person, but not in the sense of an animated, sentient being; it denotes a system in which parts are connected, a unified whole, that which forms a basis, etc. Dharmakaya, therefore, signifies that which constitutes the ultimate foundation of existence....in a word the Absolute."

The Nirmanakaya.—There is then, according to Mahayana Buddhism, a highest Being which is the ultimate cause of the universe, and in which all things find their essential origin and significance—the Dharmakaya. But in addition to this, Mahayana teaches that the Dharmakaya does not remain in its absoluteness, but reveals itself in the realm of cause and effect. It then takes a particular form, and becomes a devil, god, man, deva, or even an animal, adapting itself to the conditions and the intellectual development of the people. This may be looked upon as the second body or aspect of the Bhutatathata or Suchness and is termed the Body of Transformation, coming very near to the Christian idea of God the Son, whose duty it is to incarnate Himself as a means of teaching mankind the truth, and thus securing their salvation.

But while the Buddhists thus have an incarnating or transforming aspect or body of the Absolute as have the Christians, the method of incarnation differs widely. In Mahayana it signifies that the one in whom the divine is incarnated is filled with the spirit of the Nirmanakaya, or is guided by its influence. Mahayana may be said to imply, and even explicitly states, that wherever there is goodness and holiness there is a Nirmanakaya. The Avatar then (to give the Buddhist name for the being in whom the divine is incarnated), is both divine and human, or whatever, at the same time. He is divine inasmuch as he reflects or manifests or is one with the Trikaya, yet he is nevertheless distinctly animal, or human, or devic, etc., in this respect being unlike the Christian conception of God the Son and His Incarnation.

The Sambhogakaya.—Corresponding to the Christian Holy Ghost, certainly inasmuch as it is the third person in the Trikaya or trinity, is the Sambhogakaya. Unfortunately, however, although redundant and overemphatic on some points, Mahayana is undecided and ambiguous on others, and the question as to the exact nature of the Sambhogakaya is among these, the different Mahayana authorities all differing among themselves. Suzuki, although himself a Buddhist and one of the foremost authorities on the subject, assumes an agnostic position and declares that he has been unable to fully comprehend its attributes. Lloyd, who derives Mahayana Buddhism from Christianity, asserts that it corresponds to the Christian Resurrected Christ, and M. T. Kirby, although denying this, agrees that the Sambhogakaya and the Holy Spirit are not the same. On the other hand, Anezaki and several other authorities affirm their similarity. I, personally, am led to agree with the latter school, and while the two are by no means identical, yet must they be considered as corresponding more or less closely with one another. The

Sambhogakaya is literally the Body of Bliss, the attaining of or communing with which insures the highest happiness. It is, to use the words of Kashyapa, "the all-excellent Truth, eternal, omnipresent, and immutable."

Additional Trinities.—In addition to the above trinity, popular Buddhism teaches another one consisting of Amida, Kwannzeon or Kwannon, and Seishi. Amida is the abbreviated form of Amitabha (Boundless Light) and is identical with the Dharmakaya, except inasmuch as popular superstition has anthropomorphized Him. Kwannon is a corruption of Avalokitesvara ("the Lord who looks down from on high") who is also the second person of the Thibetan or Lamaistic trinity, and is supposed to have come from Persia. Kwannon was originally conceived as a man, but in China the sex was gradually changed, and we see him sometimes as a man and sometimes as a woman, and frequently as both, one half of the figure being male and the other half female. In Japan the female aspect has tended to predominate. Kwannon is the god or goddess of love and mercy, while Seishi is the personification of wisdom.

Furthermore, philosophic Buddhism of all sects teaches a third trinity composed of (1) the Dharmakaya, or really the Trikaya, (2) Bodhi, and (3) Hridaya. Bodhi is that portion of the Absolute (Bhutatathata) which is manifested in the world of cause and effect, the incarnation of the Universal in the realm of particularity. It is, in a word, the divinity within us and the whole world. Hridaya is that within us which quickens faith, and may therefore be said to correspond even more closely to the Christian Holy Spirit than does the Sambhogakaya. These trinities exist side by side and do not, to the Oriental mind, seem contradictory, all being but aspects of the One Absolute.

Gods and Devas in Mahayana.—But while in one respect Mahayana is essentially a monotheistic faith (for the

Trikaya like the Christian Trinity forms but *one* God), Mahayana is in another sense polytheistic, since in addition to the Bhutatathata and the Trikaya we have a vast number of minor gods and devas, and in the *Paranirvana Sutra* we find the Buddha recorded as saying, "For twelve leagues, Ananda, around the Sala Grove, there is no spot in size even as the pricking of the point of the tip of the hair which is not pervaded by powerful spirits." As a matter of fact, however, the ideas of Buddhism on this point are practically those of Christianity, especially of the Catholic branch, since these gods—more properly devas ("shining ones")—are but the Christian angels under another title. Mahayana declares that these supernatural beings are not all of equal importance or power, just as we find in Christianity the distinction made between angel, archangel, cherubim, seraphim, etc., though for the most part Buddhism is not so categorical. The "gods" in Mahayana, however, vary from evil devils through harmless but mischievous wood-sprites and fairies, up to beneficent devas, etc., until we transcend the limits of personal beings and come upon personifications of great principles (such as Jizo and Kwannon for mercy, etc.).

As we have already noted, Mahayana agrees with Hinayana in teaching that these gods of various kinds are not, in spite of their majesty and glory, things in themselves, and are therefore subject to decay and change, though maintaining a seemingly unchanging existence for perhaps millions of years. As a general thing it may be said that Mahayana Buddhism maintains that there are two orders of evolution, the divine and the human, that both are at present imperfect but that both will finally reach complete enlightenment, though by different stages of development and by different paths of progress.

Buddhahood. The Incarnation and the Atonement.—We have already seen how in a general way the idea of the incarnation is taught by Mahayana under the doctrine of the Nirmanakaya. This same conception, however, is again met with and more fully developed under the teaching regarding the Buddha. A Buddha according to Mahayana is, as we know, one of those holy beings, who after renouncing Nirvana for himself continues to work for the salvation of the world until the highest possible enlightenment (Buddhahood) is attained. Now to become a Buddha is, in the eyes of the Mahayanist, to become one in essence with the Infinite. Accordingly, a Buddha may be said to be the Trikaya actually incarnate under human guise. In this way, says the Northern Buddhist, was Shakyamuni a reflection of the Dharmạkaya, and in this way were all the other great teachers and saviors of humanity, among them Jesus, the Christ.[13] So much, indeed, are the Trikaya and a Buddha considered to be one that not only do we find a Buddha regarded as a manifestation of the Dharmakaya, but even when the Mahayanist desires to portray the latter, a figure of a Buddha is used.[14]

An exact analogy to the Christian idea of the Atonement is, of course, impossible, since the Buddha is supposed to have died a natural death. Nevertheless corresponding closely to it, we have the Buddhist doctrine of the "Turning Over." According to this, the Buddhas (Christ among them) have renounced the fruit of their noble deeds and have turned them over to humanity at large—a sort of imputed righteousness of the Christian Protestant or the supererogation of the Catholics. In this connection one may quote one of the Buddhist Sutras which says, "In all the world there is not one spot so large as a mustard seed where he [the Buddha] has not surrendered his life for the sake of all creatures."

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[13] It is curious to note how Christianity and Buddhism have accorded high honors to each other's founders, Christ in Buddhism being a sort of Buddha, while, on the other hand, Buddha, under another name, is one of the canonized saints of Catholicism. I do not wish to imply, of course, that Mahayana officially declares Christ to have been a Buddha, for Mahayana was formulated before the birth of Jesus, but Mahayana states that all great religious leaders are more or less perfect Buddhas, and modern Mahayana scholars agree in placing Christ foremost among these.

[14] Thus the Daibutsu at Kamakura and others so famous in the West are in reality not the historical Buddha at all, but Amida or the Dharmakaya.

The Bodhisattvas.—Ranking next below the Buddhas as objects of worship, Mahayana places the Bodhisattvas. Now a Bodhisattva, as has been seen, is one who at some future time will be a Buddha, and being thus an embryo Buddha, is worthy of some respect and worship. One of the chief differences between Hinayana and Mahayana, however, is that the latter teaches that its followers are all in a way Bodhisattvas or Buddhas-to-be, so that in Mahayana to-day, the term is usually applied to those persons who are near the gate of Buddhahood and are therefore particular objects of reverence. As a matter of fact, this doctrine of Bodhisattvahood has been of especial benefit to Mahayana Buddhism, and this for two reasons: first, since it teaches that all men are Buddhas-to-be, it inspires a desire to quickly realize the ideal; and secondly, which is more important, it has better enabled Mahayana to absorb the native religions in the countries which it has invaded, and therefore win admittance for itself. The ancient native worship of all the Far Eastern countries is ancestor-worship, and more especially hero-worship, and this the people are unwilling to surrender, although they are quite willing to worship something in addition. Accordingly we find many of the principal characters in Japanese and Chinese history disguised as Bodhisattvas (in the sense of near-Boddhas) and masquerading under Sanskrit names, thus allowing the ancient native religion and the newcomer, Buddhism, to live amicably together.[15]

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[15] Christian missionaries in China and Japan have often noted that one of the reasons for the comparatively slow progress of Christianity in those countries has been due to the lack of such an accompanying feature, at least in the Protestant branches.

Heavens and Hells.—One other prominent feature of Mahayana Buddhism in its religious aspect is its acceptance of an infinite number of worlds, both physical and super- and sub-physical. Mahayana does, indeed, teach that the highest bliss (Nirvana) and the deepest misery are purely mental states, irrespective of the place of existence, yet it nevertheless teaches that in addition to innumerable other material planets, there are also countless heavens and hells, varying widely in intensity of suffering and bliss. As in Christianity, the heavens are gained as a reward for meritorious deeds and the hells as punishments for wicked ones, with one important exception however, namely, that although malefactors are unable to enter heaven, virtuous men can enter hell, and often willingly do so in order to help those who are confined there. Unlike Christianity, or at least its orthodox branches, Buddhism teaches universalism, not only in the sense that all beings will finally be freed from the hells, but that even the heavens will at length be emptied since the final goal of all is Nirvana, which is far superior to even the highest heaven.

It would be impossible to even enumerate the principal heavens and hells which the Buddhist philosophers and theologians have evolved, but mention must be made of Jodo, the Western Paradise, the highest heaven according to the Jodo and Shin sects, into which one may be reborn at death by possessing a firm faith in the saving power of Amida during this life, and which leads directly to Buddhahood or Nirvana.

[TO BE CONCLUDED.]

WM. MONTGOMERY MCGOVERN.

KYOTO, JAPAN.

NOAH AND HIS FAMILY.

IN the long enumerations of earlier patriarchs Noah claims our special interest not only because he occupies more space than any patriarch before Abraham, but because he has preserved most clearly some of the original mythological features which the unprejudiced critic will expect in the representatives of the heroic traditions of any nation. Thus Noah is so distinct from the lifeless figures as which most of these patriarchs appear now, that he must be enigmatic to the ordinary theologian. Even those who wished to be critical have expressed their wonder at Noah's unusual character so incompatible with their anachronistic conception of a perfect saint, i. e., a conception formed according to the ideals of the latest Judaism or of Christianity.

From the few writers who have kept themselves free of such anachronisms and have shown insight into the peculiar thinking of the ancient Orient, I quote Alfred Jeremias:[1] "Noah," he says, "has been surrounded with the motives of the bringer of a new era." To substantiate this claim, he refers to the name Noah, which was connected with a root meaning "rest"; to the parallel play with its etymology, Gen. v. 29, that "the same shall comfort us from our work"; and to Noah's connection with the vine, the symbol both of a new era and, Jeremias believes, of dominion over the upper world.[2] His drunkenness and obscene behavior reappear in another survivor of a great catastrophe, namely in Lot, whose two daughters are the counterpart of Noah's two virtuous sons, as the great conflagration of Sodom forms a parallel to the Great Flood.

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[1] *Das Alte Testament im Lichte des Alten Orients,* second edition, p. 250. The English translation (I, 273) mitigates the expressions considerably.

So far Alfred Jeremias. We can emphasize these very cautious expressions and state more boldly: our patriarch bears, as the regenerator of mankind, largely the character of the dying and reviving god worshiped all over Western Asia, Egypt, and Europe under many different names, in Egypt as Osiris, in Asia Minor as Attis, Dionysos, etc., in Canaan under the name of Adonis or Tammuz (which latter name reappears in Babylonia in shortened forms like Dûzu). This important divinity bears largely solar character but may represent all changing nature, as we now see especially clearly, e. g., in the case of Osiris; the parallel stellar explanations, which we must expect in Western Asia, are very complicated. The reason for comparing Noah with this mortal and yet eternal god is that this god is frequently connected with the origin of mankind. We shall examine the application of his characteristics to Noah in detail, and the peculiar motives characterizing him.

We must find it strange that the Biblical text does not mention at all what we should regard as the most important reason for the characterization of the Flood hero as the "comforter" (or, as we should rather expect, "savior"), namely that he rescued mankind from destruction in the Deluge and reorganized it. As the scanty narrative stands now, evidently badly mutilated by the arbitrary handling of suspicious priestly expurgators, it has retained, nevertheless, a trace of earlier thinking in the explanation of Noah's significant name: "The same shall comfort us from (A. V. concerning; R. V. of; Am. R. V. in) our work and from (the same variants) the toil of our hands because of the ground which the Lord hath cursed." This expression is unusual in the employment of the preposition "[away] from," as all translators have felt. If we prosaically understand the blessings which Noah brought to mankind, exclusively or principally of the discovery of wine, then we may explain that expression thus that the new drink will comfort man *so as to make him forget* his hard agricultural toil. This toil remains what it has been since Adam's time, but now it can be borne so much more easily with the exhilarating and strengthening fruit of the vine. This interpretation seems to be meant in Gen. v. 29, and some modern exegetes are satisfied with it. Nevertheless it is only a piece of old rationalism trying to explain in too jejune a way why the vine was held in such high esteem by all religions of the ancient Orient.

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[2] The latter point is debatable. I can only find that the vine often represents heaven, so that it is nothing but a symbolization of life, especially eternal life. Illustrations for this idea are given below.

Of course, such rationalism is very far from the truth; the reasons why all religions down to the Christian attached to the vine the profoundest symbolism are not so prosaic and simple. To illustrate the mystic valuation of that symbolical plant in early Christianity, I may point to the fact, not yet observed as far as I know, that the Gospel of John, a book especially inclining toward religious symbolism, makes Christ begin his public ministry by the miracle of changing water to wine and close it with the elaborate simile of the true vine, chap. xv. We must bear in mind that this mystic respect for the vine, the fruit of which "cheereth God and man" (Judges ix. 13), appears the deeper in the mind of the ancient Orientals, the farther we can go back into their mythologies. They did not express it as onesidedly as the Greeks when the Asianic cult of Dionysos came to them; nevertheless, the rich mythology which surrounded the young sun-god under the names of Dionysos, etc.—a wealth very little intelligible to the Greeks who preserved it only mechanically—originated in the

Orient. We cannot enter here upon a discussion as to how much of that mythology was derived from Asianic cults and how much goes back to the more original sources in Syria and Egypt. As I hope to show later, in another essay, Egypt contributed a much larger share to that Dionysos mythology than is usually admitted. It is of high importance, e. g., that we have now in hieroglyphics the repeated statement that the great celestial god (especially in the form of the dying god Osiris whom the Greeks accordingly identified with their Dionysos) was born (or begotten) through the grape (or wine), tasted (or used) by the eternal virgin, i. e., the goddess of heaven.[3] This must not necessarily be interpreted to imply that the theories connecting the vine with the origin and development of mankind arose in Egypt first. Although we shall hardly ever be able to find them in Asiatic inscriptions as early as in Egypt,[4] nevertheless they may have wandered to that country, at a much earlier time, from Western Asia. There, at any rate, the vine played a much greater part than in Egypt, where beer-like beverages always prevailed over wine.

Be that as it may, we can now see how the story of the heavenly fruit originated by which the first mortal god, i. e., the progenitor of humanity, died and yet became immortal—immortal at least in his offspring, or otherwise. In what way the Babylonian story of how mankind lost immortality (by Adapa refusing to eat celestial food) depends on the myth of the vine is difficult to say, whether it is an old parallel or an inversion of it. At any rate, both cannot well be independent from each other. In the form in which the myth of the heavenly fruit is presented by the Bible, various versions seem to have been blended.

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[3] See W. Max Müller, *Egyptian Mythology*, pp. 36, 113, etc.

[4] Only the Sumerian name of the vine as the "tree (or bush) of life" is a trace of the antiquity of that mythological idea in Babylonia.

Both the Adapa motive is visible there (in God's prohibition) and the other motive, in the half-effaced idea that by eating the fatal fruit, sexual love and propagation were originated in the human race. Although the story, and especially the detail of the forbidden tree's nature admitted of many variants, yet we may be sure that, also among the Hebrews, what was explained as the fatal fruit responsible for the origin of mankind was by preference the grape. Now Adam, the first man, has his antitype in Noah, the new progenitor of mankind; therefore Noah had to be surrounded with as many motives of the Adam-Osiris-Dionysos stories as possible; see above.

We need not strive with the problem of disentangling these very complicated motives; the most important point here is why Noah had to be characterized by the vine. If a reader should not be satisfied by the rationalizing explanation which the Biblical narrator gives of that venerable but obscure plant-symbol, he might insist that the expression "comfort away from," which has given so much trouble to the commentators, still remains unusual, and he might find in it an indication of a more thorough deliverance of mankind from misery by Noah. Some may venture the hypothesis that this indicated, originally, a more optimistic and general explanation of Noah's agricultural activity, namely that he brought God's blessing to mankind and made the whole ground so much more productive that Yahveh's curse, Gen. iii. 17-19, did not hold any longer.[5] If we were sure of this, we should recognize the idea that the beneficent god Adonis manifests himself principally in all vegetation in which he eternally dies and revives. He shows this immortality especially in grain which, as the principal life-sustaining plant, is a lower parallel to the higher life-giving plant, the vine (possibly also because imitations of wine can be prepared from grain). This idea led in late Egypt to the rationalistic version, preserved in Plutarch, that Osiris taught men not only the cultivation of the vine but agriculture in general. A parallel with such a rationalistic explanation of the god of vegetation and harvest might be found in Gen. ix. 20: "And Noah began to be a husbandman."[6] This theory can, however, not be demonstrated with certainty in the present Biblical text which speaks only of Noah's planting a vineyard. Thus, in the light of the old mythological speculations —whether we treat them as old, purely Asiatic ideas, or as influenced by the Egyptian Osiris mythology—it may remain safer to limit Noah's blessing, indeed, to the invention of wine.[7]

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[5] The *dianapausei* of the LXX admits the explanation "he will interrupt" or even "he will end"; the Hebrew manuscript of the LXX seems, however, to have made the play with *nuah*, "rest," more distinct by reading *yaniah*, "he will make rest."

A borrowing from Egypt becomes more probable when we examine the mythological details connected with the wine-drinking of this second Adam, namely Noah's obscene drunkenness in his tent (Gen. ix. 21). So far we have a parallel only in Egypt. Osiris is often represented ithyphallic, lying on his back. Egyptian mythology usually explains that thus the god, after his death, begat a son with his sister-wife Isis (or two sons with Isis and Nephthys). The variants describing this as happening in his drunkenness can, in Egypt, be restored from hints in the very earliest traditions (W. Max Müller, *loc. cit.*). As has been noticed, e. g., by Alfred Jeremias (see above), we have in the Hebrew tradition the same detail in Noah's parallel, Lot, who unconsciously, i. e., while very drunk, begets the progenitors of two great nations with his two daughters.[8] These daughters evidently correspond with the Egyptian goddesses Isis and Nephthys whose close relationship to the drunken god admits Egyptian variants, bringing the myth still nearer to the Hebrew story. Outside of Palestine, exact Asiatic parallels are not known so far, but it is again possible that those details will be found scattered in the corresponding traditions of other Asiatic countries which worshiped the renascent god.[9] The probability that we have in the two Hebrew stories of the drunken obscenity of the first man, not the old Asiatic Adonis motives but a distinct loan from the Egyptian Osiris myth is increased, however, also by the detail that drunken Noah lies, in his shameless attitude, in his tent. A settled agriculturist ought to have something better, a house, or at least a hut, and the drinking inside also does not look quite natural. If we remember that Osiris, when he is represented as begetting offspring after his death, rests in his sarcophagus, we have a satisfactory explanation of the "tent" as a small, probably square, frame surrounding Noah. It is, of course, only a variant of the box of Adonis, but the begetting from the chest is distinctly Egyptian, as far as we know; it rests on the specifically Egyptian development of the dying god as master of the dead, which, in the Osiris mythology, overshadowed all earlier functions of that originally Asiatic god, so that the chest became the sarcophagus.

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[6] The Biblical writers, of course, would have had to reconcile such a view with the story of the beginning of agriculture as being imposed, as a punishment, on Adam, the other personality bearing largely the character of Adonis. However, they would not have found it difficult to do this.

[7] The Biblical text does not make it quite clear that Noah was the first vine-grower, but Noah's parallels in other mythologies confirm this theory which has been generally accepted by modern exegetes even without recognition of those parallels. Adam found the plant wild, Noah cultivated it.

I should not lay so much stress on Noah's ark as proving special Egyptian characteristics. Originally the ark was the square box in which the new-born sun-god drifted around in the abyss covering the whole world; that it was well closed symbolizes the dense darkness in which the new god appeared.[10] Also the "box of reed" in which Moses floated on the Nile, belongs to Egyptian mythology; for the birth-story of that new type of Adonis-Tammuz—because Moses is another savior of mankind from death, sin, and ignorance—intends to be Egyptian in coloring. But the birth-legend of Sargon I[11] likewise describes how the virgin mother put the baby in a box of reed, covering its door (i. e., lid) with bitumen, and let the box float down the river. So this motive of the box can be traced in Mesopotamia back to the golden age of Babylonian literature, around 2000 B. C., to which the Sargon myth seems to belong. It is surprising that the Babylonian Deluge story does not as carefully as the Biblical writers emphasize that Noah's vessel, which saved humanity, was only an enlarged imitation of that box which had saved the divine infant,[12] the progenitor of humanity. Missing this speculation, the Babylonian simply makes the saving vessel a big ship. We need not dwell too much on this detail as betraying the later character of that epic. We can see from the Egyptian parallels that the original square vessel first becomes a basket watched by the heavenly goddess Isis (Müller, *op. cit.*, Fig. 120), and then a simple ship, such as a small boat made of reed and papyrus (*ibid.*). This vessel can then easily be connected with the two important ships used in the present condition of the world: the boat on which the sun-god every day sails over the blue sky, or the ferry-boat on which the souls cross the dark Stygian waters to reach the realm of the dead.[13] Thus the constellation Argo, the stellar picture of the divine ship (Müller, *op. cit.*, pp. 57, 116, etc.), may be explained as the box containing Osiris as babe or as mummy, or as a small ship in which either Orion stands as the divine ferryman (see below) or which Canopus, the principal star of the constellation Argo, pushes or rows, or, lastly, as a large vessel with a numerous crew, as in the Greek Argo story, with Canopus as steersman.[14]

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[8] Some modern commentators have considered this myth as specially invented by Hebrew hatred in the intention to disgrace the hostile neighboring nations Moab and Ammon as the worst bastards, born out of the grossest incest. The Jewish rabbies, probably, began to interpret it in that malicious sense as soon as the old myths were dead and as unintelligible to them as to those modern theologians. As long, however, as those myths were somewhat understood, the story of Moab's and Ammon's origin ought not to have shocked the readers and may even have reflected esteem for those close relatives of the Hebrews. Mythology knew no prudery.

[9] On the astral explanation of the two daughters see below.

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[10] Cp. on this box in Egyptian mythology, W. Max Müller, *Eg. Mythology*, pp. 71 (where the box is said by priestly interpreters to symbolize Nut, the heavenly ocean at night-time), 76, 94, etc.

[11] Pinches, *Proc. Soc. Bibl. Arch.*, XVIII, 257; A. Jeremias, *op. cit.*, p. 410, etc.

[12] Christ's birth-box could not well float because Bethlehem is situated in too dry a hill country. Therefore it had to be a manger, a stellar motive parallel to that of the floating box Argo. Although Luke (ii. 7) does not say so expressly, there is hardly a doubt that he had, with his mention of the manger, the important symbolism in mind that thus the divine infant rested between or below an ox and an ass, i. e., the manger represented on earth the square frame of Orion, the hero, which stands between the constellations Taurus and Lepus; the latter can be explained as a small ass because of having long ears. This symbolism, which extra-Biblical traditions have correctly preserved, recurs partly (John xii. 15) when Christ at His public triumph appears riding on the colt of an ass, like Orion on Lepus-Asinus (in Egyptian mythology: Horus victorious over Seth).—If the constellation Argo is explained as the manger, Christ appears above it, as the imperfect perspective of primitive art would represent Him lying inside.

Of all these speculations, so far, little has been found in original Babylonian sources, the principal center of Asiatic mythology, not because the Babylonians possessed less fancy than the Egyptians but because we still know too little of their literature and are forced to reconstruct much of their mythology only from its reflexes in the mythologies of other nations, a difficult and often hazardous task. The Babylonian Deluge myth harmonizes different ship-theories by explaining that Ut-napishtim, the Flood hero, and his ship were removed by the gods, after the Flood, to the supernatural world. The hero dwells now "at the mouth of the rivers," i. e., not as according to modern phraseology: where the rivers flow into the ocean, but at the opposite end, namely, where all rivers have their source in the stream branching off from the great reservoir of the world, the abyss.[15] This idea has most remarkable Egyptian parallels, on which, however, I cannot fully enter here. Originally, the hero Ut-napishtim must have become the ferryman on the Styx after the Flood. In the later development of the Gilgamesh epic he has a servant, the ferryman Ur-ninim,[16] who must assume, e.g., the manual task of bringing the wanderer Gilgamesh over to "the eternal Ut-napishtim" whom Gilgamesh wants to consult about eternal life. The Flood hero thus has become a master of the subterranean regions, exactly like "Osiris, the Lord of Eternity," who once floated about in his miraculous chest and now sits on his throne, at the source of the Nile and of all waters, guarding there the plant and source of life. Evidently, Ut-napishtim has given over his ship to his double and servant to use it as ferry-boat. Variants, of course, make the deified hero keep his seat in that memorable ship without using it, again like Osiris.

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[13] These two vessels can be identified when the sun-boat is employed during its night course, on the lower ocean, to ferry the souls.

[14] On the interchange of the closely connected constellations Orion and Argo, see above; the square frame of Orion can then likewise be explained as a box (or ship?).

These Babylonian theories consider the master of the saving ship as a deified man, inclining toward euhemerism. In the Hebrew traditions we can discover traces also of the opposite theory, namely that the savior of humanity came from the supernatural realm, i. e., from the deep (which, of course, nevertheless is a part of the sky according to ancient cosmology). This divine incarnation is betrayed in the various divine characteristics of Noah. Of course, the other view, preferable to priestly writers, is expressed much more plainly, namely that Noah was chosen to save humanity as *the most pious man* of his age. That he "walked with God" (Gen. vi. 9) was probably soon misunderstood in the now prevailing fashion, being referred to his good moral behavior before his removal to heaven; originally it seems to have meant: he lived with God, after the Flood, having been removed to heaven in consequence of his righteous life. The variant with Enoch (Gen. v. 22, 24) points much more clearly to that original sense,[17] although the text is confused in both verses.

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[15] The constellation representing his ship, Argo, belongs therefore to the southern part of the sky, emerging from the lower world only for some time of the year.

[16] This name shows his connection with the watery depth (Jensen, *Gilgamesh Epos*, p. 30), so he represents in all probability another ferryman, a predecessor of Ut-napishtim. In the Deluge ship there was likewise a captain or steersman, Puzur-bêl, whose meaning remains to be determined.—The connection of the Babylonian Flood hero with Nergal, the god of the earth and the lower world, gives another explanation of his present seat; the depths of the earth belong to Nergal as well as to Ea, the abyss.

We must consider the question: What was the original name of the Hebrew Flood hero? The tradition about that name, evidently, was extremely uncertain, especially owing to the imperfect character of the Hebrew script. Exactly as, e. g., the name of Adam's son presented difficulties in that indistinct writing, so that the priestly scholars of Israel had to find a different etymological story and a different place in their chronological arrangement of the patriarchs for each of the readings—(1) Hebel (i. e., the Abel of the various versions and the English Bible), (2) Jabal or Jubal, and (3) Tubal(-cain)—so also with the Flood hero.

The variant preserved in the Flood narrative, Noah, looks like a too easily explainable reading of the name. It has been observed long ago that the name Enoch (better Henoch, in Hebrew Chanôk) apparently is only a variant of Noah. The letters *N-w-ch* seem to have been arranged in different order: *Ch-n-w*, and then the *w* was read *k* (or *vice versa,* the latter variant betraying a rather archaic type of the alphabet). The 365 years of Enoch (Gen. v. 21), like the similar 350 years of Noah after the Flood (ix. 28) and his walking with God (see above), show that Enoch and Noah are, at least, the closest parallels as cosmic personalities. The *Book of Enoch* connects its hero with the Flood in such a way that we see, it remembered him as the original Flood hero; also its description of Enoch as the wisest of all men who fully understood the order of earth and heaven is remarkable, showing him parallel to the Babylonian Flood hero who is also called Atra-khâsis or Khâsis-atra (Xisuthros of Berossus), "the very clever one." The motive that his superhuman wisdom qualified the Flood hero to reorganize the world is thus as well preserved in the late Hebrew tradition as in the scanty Babylonian source. The latter describes Khâsis-atra as the only person who can solve the deepest world-problems, above all the problem of life and death.[18] The doublet of Enoch's mention, Gen. iv. 17, has not been explained in every detail. That here Enoch is made a son of the violent Orion-type, the wanderer Cain, corresponding to the parallel character Lamech, Noah's father (see below), in the chronological scheme of the Priestly Code (Gen. v. 28), confirms again Enoch's identity with Noah. The city which Cain-Orion built for his son, Gen. iv. 17, is of course a variant of the explanation of the neighboring constellation Argo as the miraculous chest in which the good god (Osiris-Adonis, etc.) rests forever. This resting in a peculiar chest or chapel is the most important characterization of that god, furnishing the Biblical type for Enoch. The floating box is transferred to the firm ground as a home prepared in this case for the new-born child; in this habitation the son enjoys the rest which the wandering father sought in vain, and thus inaugurates a new era of blessedness for mankind, exactly like Noah. That the parents explained the significant name given to their child recurs several times in the Yahvistic narrator, chap. iv;[19] but only here, in the case corresponding with Noah, the significant etymology is applied also to the habitation of the hero. This and the meaning of Chanôk-(H)enoch, "Dedicated, Hallowed" (but see below on the more original form), confirms the great importance of that dwelling which reappears later as the tent of Noah (ix. 21; cp. above). A rationalizing reviser of the Biblical text changed the "house" to "a city" thus showing that he no longer understood why the original source treated that building, erected for Enoch, as so important. We comprehend its significance in the light of the parallel mythologies, notwithstanding that distortion of the text which made most subsequent literalizing readers wonder whether the dwelling of one man, or at best of a family of three, could constitute "a city." Possibly the very application of the name "Dedicated" to that habitation represents the thought of a later scholar, who believed that the unusual name fitted a building better than a person, but anyhow, the importance of the dwelling is the most original feature of the text, and the double mention of (H)enoch's name in Gen. iv and v, seems to confirm the relative antiquity, at least of the verbal root *chanak* for the consonants of the hero's name. The pronunciation as assumed by the Hebrew tradition indeed agrees with the meaning "Dedicated, Hallowed," but we may safely assume that the original pronunciation had active meaning, "the Hallower, Inaugurator" (i. e., of the new era of mankind, not only of the house or city).

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[17] Which, I believe, M. Jastrow pointed out once. The phrase is by no means synonymous with "walking *before* God" as the ordinary Bible commentators think.

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[18] See above on his connection with the plant and spring of life, corresponding with the functions of Osiris.

[19] Only once with the writer of the Priestly Code, Gen. v. 29, who retains such an etymological play only for Noah, the most important personality between Adam and Abraham.

The relative antiquity of the two names (H)enoch and Noah is not easily decided. The priority must not be given rashly to the form Noah because its etymology "Restful" yields only too obvious and beautiful a sense in the light of ancient mythology.[20] The obscurer name (H)enoch ought to be nearer to the original form, according to a well-known rule for textual criticism; possibly also the next group of names may furnish a confirmation of this theory. Nevertheless, we cannot call (H)enoch the original name of the hero with full certainty.

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[20] It is one of the strangest things that this absolutely clear meaning of the adjectival form *nôah* has not been noticed by the modern commentators. They mostly consider the meaning "rest" and dismiss it without coming to a result. The noun "rest" is *nûah*; the careful distinction of the adjectival form which we find attested to already by the testimony of the Septuagint (*Nôe*) shows the correct understanding of Noah's mythological character. From the

The question of the original form of the hero's name is complicated by the comparison of another group of name-variants which may likewise have been derived from the unknown original of the name of the great savior of humanity.[21] This new group presents, in the proper names, variants which are all vaguely similar, but at the same time different enough to make a restitution of the original form from which they were derived, very problematic. This group also introduces a wealth of mythological variants which leave us often in doubt whether they are intended to represent parallels of Noah or counterparts. All name-variants of this group, as they appear now, begin uniformly with *L-*, have a lip-sound as second letter (*m*, *w*, *b*,)[22] and a long-tailed final letter. We begin with the most characteristic person, Noah's father, Lamech.

He is treated as somewhat parallel with the Flood hero, as the speculations about his lifetime sufficiently betray: he begot his son when he was 182 years old, i. e., half the year number 365; the 777 years of his whole life show another speculation.[23] His parallel and son, Noah,

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Biblical fragments alone, of course, it was hardly possible to understand this character and the meaning of the patriarchal name.

[21] With this group also the variant Enosh is to be connected, as is proved by the corresponding position of Sethitic Enosh and Cainitic Enoch, both standing in the third generation of mankind, also by the 905 years of Enosh corresponding with the 950 of Noah. 905 is the more suggestive number and seems to be preferable to 950. See below on this and the simpler 365 of Enoch.—The change of the initial letters, Kheth and Aleph, in the two names is interesting because it admits various explanations; that of the final letters Shin and Kaph is easy.—Whether a Phrygian Flood hero Anakos or Nanakos belongs to Enoch etc., is a disputed question, so this doubtful name cannot well decide the question of the original name-form.

[22] This result of the graphic mistakes is, however, accidental.

[23] Either that he was, other features notwithstanding, as a hero a perfect man, or referring to the "seventy sevenfold" of his song (LXX, 753).

lived a similar number of years (350) after the Flood; Noah's total of 950 years seems to be a distortion of the better number 905 (cp. note 21, on Enosh), betraying as its basis a tripled shorter year of 300 days with the five epagomenal days of the normal year (365 = 360 + 5) added once. His 600 years before the Flood show the same cosmic number doubled. Below we shall return to the probability that Lot's name was only a graphic variant of the name Lamech (or its earlier form). Although Lot forms more of a parallel with Noah, since both are heroes of salvation from a great catastrophe, yet Lot is analogous to the other heroic type by his two daughter-wives, mothers of two great nations. His nearest analogy is thus Lamech, Noah's father and counterpart, who had two wives, Adah and Zillah, about whom we learn, unfortunately, nothing else but that they had important sons with suspiciously similar names (see above on Abel-Jabal-Tubal).[24]

Lamech is a very important personality in the line of patriarchs, standing parallel and yet in a marked contrast to his son Noah. His character is shown principally by his slaying of the wanderer Cain, although this is excused as unintentional. He thus violently ended the old era and inaugurated a new one which is characterized by his peaceful counterpart and son, Noah. Lamech's characteristic deed is clearly described in extra-canonical traditions;[25] in the Biblical text, Gen. iv. 24, it is only faintly recognizable by the contrast between Cain and his slayer, Lamech:

> "If Cain shall be avenged sevenfold,
> Truly Lamech seventy and sevenfold [shall be avenged]."

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[24] The names of these two wives, however, look very suggestive; they can be interpreted to mean that the first was "comely" and the second "shady," i. e., dark or hidden. We recognize here the characters of Rachel, the fair one, and Leah, her ugly sister, who obtained a husband by hiding her face. This husband, Jacob, is another parallel of Lamech; see below.

[25] *The Life of Adam,* cp. Dillmann, in Ewald's *Jahrbücher der biblischen Wissenschaft,* V, and in his annotations to the Ethiopic version of Genesis which has preserved clear traces of that tradition about Cain's end.

Now this violent Lamech, the blind shepherd, is a double of his victim, the wild wanderer Cain, whose 910 years of life betray the tendency to make him likewise parallel to Enosh's and Noah's lives (905, 950). That Cain, running wildly into the land of Nod with his face turned back, signifies Orion as a foolish, violent person,[28] has now been generally recognized. Lamech shows his Orion character by his two wives, i. e., the two dogstars following Orion, and by his bold song; both Cain and Lamech appear as father of a Flood hero, iv. 17; v. 28. So we have here the motive recurring in various mythologies that the old Orion is killed by the new one (or *vice versa*). The hero renews himself by his own bold act.

This act, which must seem impious when perpetrated on a double distinct from the murderer, or incomprehensible when the identity of that double with the slayer is emphasized, is explained or excused as inadvertently committed: the slayer's face was turned away, or hidden, or he had become permanently blind. So in the extra-Biblical report on Cain's end it is not yet forgotten that Lamech was old and blind when he shot an arrow into the air and accidentally killed the stranger Cain. I. e., Orion with the spear or arrow (the "Resheph with the arrow" of Phœnician mythology) killed Orion, the forger of the miraculous sword. This story has been preserved most clearly in Teutonic mythology: the youthful hunter Siegfried bearing the sword forged by himself, is slain by the spear of grim Hagen. The latter lusts after the possession of the hood which makes Siegfried invisible. The simplest version of that myth must have been that the sword-bearing Orion was responsible for his own death, namely that he, either made invisible by the hood or blinded by it in a way which no mythology has clearly preserved, was accidentally pierced by that spear or arrow (hurled into the air or stretched forth) when he, in his wild roaming, ran by the other Orion. The oldest Oriental tradition explains the accident more easily by Orion's face being turned backward so that he could not see what was before him, roaming about and seeking his way to the east.[27] The variant of this myth, that it was the slayer who was blind (or blinded) like Lamech, is found, side by side with the Siegfried version, in the Norse myth, according to which beautiful Baldr, one of the most manifest Adonis types, was killed by the missile of blind, old Hödhr. The smith motive is absent there but it recurs, e. g., in the Biblical tradition, for Cain means "smith" and of Tubal-cain (uniting the names of both sons of Adam in one: see above an Abel-Tubal[28]) we are told expressly that he was "the forger of every cutting instrument of brass and iron." We will not investigate further the story of the sword with which the first smith slew his younger or, in the case of twins, weaker brother; nor can we enter upon the question how it came about that the most prominent star of Orion, the shoulder-star, was regarded by the Hebrews as the sign intended to make the hero immortal, being a warning to men not to raise a weapon against him, while in European mythologies its function was reversed, it being looked upon as the only vulnerable spot of the invulnerable warrior.[29] Other Orion motives of Cain and Lamech must likewise be omitted in this account. Reference to the two wives of the latter has been expurgated almost completely in the case of Cain; of only one of his two sister-wives, the name has been preserved in Naamah ("the Sweet, Pleasant One," corresponding with Adah, Rachel, etc.), the wife of Cain's parallel Tubal-cain, Gen. iv. 22, showing that both wives had the usual opposite mythological characters as observed above.

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[28] The Hebrew name for this constellation, *Kesil*, "the fool," shows that its hero was regarded as wild, reckless, and impious, but the majority of Orion myths treat that most prominent and most beautiful of all constellations favorably and represent it as a noble, or at least successful and victorious hero. Cp. the above illustrations from symbolizations of Christ (note 13). Most myths also allow an inverted explanation, we must remember.

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[27] This could be explained as a moon-myth because the moon recedes daily by rising later, but also solar interpretations are possible. In the Bible the old mythical detail is no longer understood, and is therefore rationalized: Cain's "countenance fell," i. e., he looked to the ground (if we do not want to correct the text to read *panû*, "turned"; cp. Gen. xxxi. 2, Laban).

[28] A clear indication that Abel and Cain were being interpreted not only as twins, but even as identical, as doubles, i. e., as the double Orion. This explains also the constant confusion of their occupations. The Noah type of a settled agriculturist does not befit Cain; in Gen. iv. 2, he seems to have been assigned that character only to show that his wandering was not original but a later punishment. In the case of Esau (Orion the hunter) and Jacob (Orion the shepherd) a clear distinction between the two characters is drawn. However, Siegfried and Osiris are murdered by their doubles while on a hunt (also Abel "in the field" evidently was hunting). Baldr is the vegetation god and yet he is felled by means of a peculiar plant which here assumes the part of the arrow or spear. This tends to show that his adversary has also command of plants (cp. the name Hagen), etc. Noah is an agriculturist and yet a tender of the animals which he takes into his ark, so both occupations are interchanged even in this plain counterpart of Orion etc.

We must now return to the question of the original name of the three different representatives of the group discussed here.

The graphic variant most akin to the form Lamech is found in the name Laban. He shows partly the type of Cain and Lamech, i. e., the Orion type, being the father of the two women who become mothers of two nations, Israel and Judah. The two sisters are married to Jacob, a well-known Canaanitish god who bears, as even the earliest and most conservative critics could not help recognizing, the features of Orion, the hero wandering to the east. Jacob's shepherd's staff, e. g., with which he gets the better of his mean father-in-law, is known to have been identified with the three central stars of Orion from the earliest time. This seems, however, a secondary explanation of that staff which must be conceived not as straight but as curved in order to understand its origin from the raised sickle-sword of Orion "the smith" (Cain), or of Orion "with the sword." So Laban may be interpreted as the harsh, old Orion who is conquered by the new, mild Orion mutilations and transpositions of letters than are here indicated, exhibit an intentional or an accidental similarity to whom he loses his two daughters and his flocks; at the same time Laban may also represent the opposite character, the resting god as a sly guardian of treasures, sitting immovable at the source of or beyond the rivers (see below on Lot). The important point for the present investigation is that the name Laban has not arisen from mythological speculations (such as "whiteness" or "milk," although these may have developed later), nor from the cult of some local god, but quite mechanically, from a different reading of the name appearing elsewhere as Lamech. Again we may conclude that the majority of the patriarchal names have arisen simply from graphic errors and uncertainties in the very limited number of original names corresponding with the few mythological types that were used to characterize those discrepant readings.

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[29] The Greek application of this motive to Achilles's heel connects it with the motive of the raised foot of Orion running or jumping and is clearly secondary (e. g., the Egyptian Pyramid texts speak only of the shoulder-star, never of the heel-star).

The form Laban confirms apparently the name Lamech, as final *n* and *k* are quite similar. (Cp. possibly also the final *k, ch,* of Enoch.) Next also the name Lot seems to be graphically related to Lamech. In this name (written with the consonants *L-w-t*) the last letter *t* can be reduced to a very archaic *k*. We have now, in the Lamech-Laban-Lot group, three letters, probably *L-m-k* (less likely *L-w-k*), which show at least in two letters similarity with the (H)enoch-Enosh-Noah group. The latter seems to be reducible to the original letters *Ch-n-k* (less probably *Ch-w-k*) and the letters *n* and *m* allow confusion; only the reading of *ch, kh,* for *l* is difficult to account for.[30]

We shall, however, not go too far into this paleographic problem. With our present material it is not safe to decide whether those two groups, which may have suffered more and whether, if we assume the former, full identity or more or less similarity was intended with the two original forms.

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[30] All of the above investigations, of course, count on readers familiar with the early paleography of the North Semitic languages, not only with the late Hebrew alphabet.

Nor can we decide this question from the character of the various personages. The two groups exhibit two rather different types which do not invite too hasty identifications. As shown above, the Lamech-group bears mostly the character of Orion as a wanderer or hunter, while in the Enoch-Noah group the character of the wise and gentle god, "resting" in his square home, at least predominates. So the idea of the Biblical writer or his source seems to have been this: the bold Lamech, the last and very characteristic representative of the age of violence as described in Gen. vi. 5, 11, 12, ends that age by slaying the hero bearing the same Orion character as he does himself, i. e., his own double who once, by murdering his gentle brother, had ushered in that period of recklessness. The last murderer or avenger begets a son of the same mild type as Cain's murdered brother; Abel's parallel Noah inaugurates now a new era of rest (as both his names seem to indicate) and of divine blessing. But in the case of Lot the motives of the two groups intermingle, and also in Noah such confusions can be found. If not the original writer or writers, at least their readers often must have tried to compare and to connect the two groups, finding in their names and persons the old principle that every new age is a repetition of the preceding one no matter how differently from this it may begin, and that the personalities of the heroic, patriarchal age, being divine, must not die but renew themselves—just like Adonis-Tammuz who either as a gentle, quiet god or as his own violent counterpart and adversary always reappears.

We have seen in the Babylonian Gilgamesh epic how the hero, wandering to the east and the great river or rivers, and finally sailing on or across these waters, finds there his counterpart, the immovable, eternal sage, the guardian of life, at the source of or beyond the waters. That the newcomer is joined to this guardian if he remains in the realm of the latter, can now hardly be recognized in the epic; what is left is only that as soon as the wanderer returns to the upper world, he loses immortality and must wander on, longing sadly for what he has lost.[31] Thus the old question is solved whether Orion is to be one with the ship Argo, standing on or in it, or is separated from the ship and even forms its hostile counterpart. We have seen above how the purest Canaanitish Orion type, Jacob, must wander to the eastern country between the great rivers to receive from his double or counterpart, Laban, his wives and his flocks. Also the Egyptian Orion story of the Haunted Prince uses this idea (strongly differentiated from the earlier and purer Egyptian Osiris conception) that the hero, as a hunter, must wander eastward to the land of Mesopotamia (or more correctly "the River Land") to win his wife, the princess of Mesopotamia,[32] but also to find his violent end there. This story is built entirely on Asiatic, more exactly on Canaanitish, motives, as we see especially from that confusion of the mysterious land at the source of all rivers with the earthly region between the great rivers—a confusion only half completed in Gen. ii. 10.[33]

Another forefather of the Hebrew nation, the wise Abraham, who founded Israel by sheer wisdom and piety, had therefore his original home also in Mesopotamia, the

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[31] This, evidently, was one of the many explanations why Orion looks back. More common is the explanation that, in one way or another, he lost immortality by looking back—like Eurydice or Lot's wife who had to take this motive from the male type. For another theory see below.

[32] The old question whether the two stars following Orion are his dogs or his wives, is there solved by giving him one wife and one dog, a later version, it seems, although appearing in a manuscript of the fifteenth century B. C.

[33] Here the name Eden confounds the mythological, extra-cosmic source of all rivers with the region around Babylon and the real land of Eden in Northern Mesopotamia. Also the name Shinear, Gen. xi. 2, confuses a region of Northern Mesopotamia with that around Babel, showing the vagueness of the Canaanitish knowledge about the eastern regions.

Canaanitish substitute for the land beyond the dark waters of the lower world, and at the source of all rivers, all life, and all wisdom. Later scholars removed that mythological "River Land"[34] still farther from its original location outside of this earth, and prosaically determined Abraham's home most exactly as Ur or Haran[35] in Mesopotamia, showing thus how far the original mythological meaning of the "River Land" had been lost. When, however, Abraham's relative and parallel Lot was said to have chosen as his place of living "the plain of the Jordan" (Gen. xiii. 10, 12, etc.) and the region where later the Dead Sea extended, this does not indicate that a local Canaanitish god of that name existed there but it shows consciousness on the part of the narrator that Lot's mythological type as a parallel to Noah required connection with the watery depths in the east and the rivers. This is another indication of Lot's Utnapishtim-Osiris-Noah character befitting his connection with a great destruction of sinners. His two (daughter- or sister-) wives conflict with his characterization as it prevailed in Canaan, but also Laban with his two daughters connects, as shown above, the Orion and the Utnapishtim-Osiris character. The origin of both names from Lamech (or something similar) accounts for this. In Egypt the dying god has as Horus, the fighter, usually only one wife, Hat-hor, the goddess of the sky, contrary to his many Orion features; in regard to the immovable, eternal Noah type Osiris, however, his pair of sisters and wives[36] is strongly emphasized, although one of these, Nephthys, stands between Osiris and his antagonist, Seth. How this deviation from the usual Asiatic distinction of the two types is to be explained still remains an open question, but in Egypt as well as in Asia we see their combination and confusion.

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[34] In Hebrew originally "(land of) rivers," **Naharim*, according to the Amarna letters (*Narima*) and the Egyptian tradition (*Naharina*); in the present Hebrew text distorted to the dual *Naharaim*, "the two rivers." Abraham's brother or grandfather Nahor betrays the same etymology from *nahar*, "river," notwithstanding one letter now changed. It is not impossible that the dualistic interpretation in the present Hebrew form is quite late, being due to an influence from the Greek name Mesopotamia.

[35] I am not as sure as some modern scholars that these places were chosen as famous seats of the moon-cult. These names may be simply distortions of Aram, unless we assume this latter name (in Aram-Naharaim, E. V. Mesopotamia) as the original. On the other hand, it is true that Abraham's father Terah seems to be nothing else but *yare(a)h*, "moon" (see above on the confusion of *j* and *t* in Jubal-Tubal etc.).

From Noah's father we turn to his children.

We all are so familiar with Shem, Ham, and Japheth, the sons of Noah, that any digression from their number seemingly so full of symbolical meaning and, in the eyes of the old school of exegetes, sufficiently agreeing with their own divisions of mankind, must to most people appear strange enough, or even impossible. Thus only a contemptuous smile was devoted by most Christian scholars to Mohammed's story, Sura XI, that there was a fourth son of the patriarch, who, in frivolous unbelief, did not listen to the pious warnings of his father and joined the infidel crowd which derided the ark-builder. The story runs thus: Allah told Noah (*loc. cit.*, verse 42) to bring into the ark the animals to be preserved and his family, "except the one on whom sentence had been passed before .... (44) And Noah called his son who was aside: oh my dear son, embark with us and be not with the infidels! (45) He said: I shall go to a mountain which will save me from the water. He [Noah] said: nobody is safe from Allah's order except the one on whom he has had mercy.—And the waves passed between both and he was among those who were drowned." Mohammedan commentators state even more clearly than the Koran that the disobedient son was the fourth, and they give his name as Canaan.[37] Christian and Jewish scholars noticed that these statements as well as the original story in the Koran ran parallel with the disobedience and cursing of Noah's "youngest son," Gen. ix. 22ff, and that the name Canaan seemed to be taken directly from verses 25-27, although this was not in harmony with the Biblical reference to Canaan (Gen. x. 6) in which he appears as a grandson, not a son, of Noah. They dismissed these evidences of ignorance with more or less contempt. Modern critics, however, have recently learned to consider Mohammed's "blunders" with a little more respect. The oral traditions of unlearned Arabian Jews and Christians in the seventh century, A. D., on which he relied are usually interesting, even where they can be called mere misinterpretations of Old or New Testament stories.[38] Not only that occasionally a remarkably good instinct is shown for the old mythical motives: there remains even the possibility that a few good traditions dating from the time before the rigid codification of the Old Testament text, may have survived among the Jews of some remote corners of Arabia.

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[36] Their stellar explanation as the two dogstars is less clear in Egypt.

[37] See A. Geiger, *Was hat Mohammed aus dem Judentum aufgenommen?* p. 109.—That in Sura LXVI, 10, Noah's wife doubts the divine mission of her husband is, of course, taken from Lot's wife but is nevertheless remarkable.

The number four of the sons of the Flood hero may therefore be considered, I think, as a mythological variant worth noticing. Noah's descendants could be treated in various manners, of course, according to the different mythological types combined in their father. The purest of these, the Adonis-Tammuz type, ought not to provide him with any family. This god usually has no children. He does not need them, inasmuch as he himself is constantly revived or reborn; both as a fighting hero and as the immovable guardian of the deep he sends only his double to the upper world. Below we shall attempt to apply the twin motive to this double and to Noah's sons. The three sons of the hero are very unusual in Oriental mythology and seem to be adapted to specifically Hebrew speculations which we cannot trace well; the division of the world into three parts furnishes only an unsatisfactory analogy.[39] The Koranic number, it is true, has a distinct counterpart so far only in Egyptian mythology. This may be accidental. Little as we seem to know about the Egyptian myths, yet we know, e. g., much less about the Babylonian religion, and may therefore hope to find that Egyptian idea there also. On the other hand, we have discussed above several possibilities that the Hebrew conception of Noah rested on some specific Egyptian traditions, and this may be the case here too. Egypt was so near and so well connected with Canaan that such an assumption is natural enough.

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[38] Cp., e. g., Mohammed's identification of Moses's sister Miriam and Christ's mother Mariam which, as H. Winckler has shown, must impress modern scholars like a piece of extremely remarkable criticism although it was entirely involuntary.

If Noah seems to bear some special Osiris features, we may consider also the Egyptian analogy of the four sons of Osiris. The very complicated role of these four genii is now explained rather fully by W. Max Müller, in his *Egyptian Mythology*. Although their original seat of worship and meaning still remains obscure (*op. cit.*, p. 112), we find them even in the earliest sources, the Pyramid Texts, associated with both forms of the dying god, the quiet Osiris and the active Horus, as companions under the name of sons. As Osiris-Horus can be seen manifested in every part of changing nature—Osiris more in the lower world and the waters below, Horus rather in the sky, but both interchanging to a great extent—so also do the four sons and guardians of this double god appear in almost every part of the world. It is shown that they were given celestial interpretations as various prominent stars or constellations; in a wider sense they were explained as the four cardinal points, or pillars, or sides of the sky, so that they represented in fact the whole sky ruled by their father as the sun-god. Next, as celestial forces or standing between heaven and earth, they had dominion over the four winds or could personify these.[40] When associated with the counterpart of all this, with Osiris, they became the four subterranean rivers or reservoirs which distribute all water over the world, to or from the four cardinal points, i. e., they were the fourfold earthly appearance of Osiris when he was described as the great abyss hidden below the earth and surrounding it as the ocean. Thus they were connected with the deepest and most mysterious source of the world, the water of life, which, coming from Osiris, gives new life to the blessed dead. Accordingly they could also be united with the counterpart or complement of this spring, the plant of life (*op. cit.*, p. 97, Fig. 89). As lords of the four winds, they could likewise express the idea of sending new life, according to the pneumatic theory of life. Dwelling in the lower world, i. e., in the south where the Nile rises from the abyss, there again they guarded the four winds which were thought to be kept in a common prison (*op. cit.*, p. 394); or, returning to the heavenly-pillar conception, they held, in the south or east, the ladder of heaven for the sun-god's daily ascent to his celestial path. In this role, as we now see, they formed the connection between the lowest and the highest spheres of the world,

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[39] Dillmann's commentary, e. g., referred, strange enough, to the three foreign races assumed by the Egyptians as a parallel. But adding the Egyptians themselves as the fourth (red) race, we obtain the number four, a rather significant fact because the races were in Egypt subject to Horus, the god of the sky and of light, who differentiated them by his rays. Thus these four races (red, white, light brown or yellow, black) might be treated as a parallel to the four sons of Horus when he is called the father of mankind. See below.

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[40] Müller has not yet compared the Egyptian representations of the winds. When some of the winds are represented with four faces, the conception of the four sons of Osiris as the winds may have influenced these (always late) representations, although the four faces of those genii are never imitated exactly. As for their various stellar explanations, I believe we can identify one. The picture reproduced in W. Max Müller, *Eg. Mythology*, Fig. 116, shows Osiris as Orion standing on a boat and touching with one hand his four sons who are crowded together before him into a narrow group. If the boat represents the constellation of Argo itself, we may see in those four personalities the four stars below Argo which form the Southern Cross. This constellation is visible in Upper Egypt during the summer. We have to assume some artistic liberty in the picture in order to bring that constellation somewhat nearer to Orion's hand than a modern star map would show. Such artistic and mythological liberties occur frequently enough in astronomic pictures of early time, so that the above proposed identification seems quite plausible.

i. e., between Osiris and Horus. The last-mentioned functions had a certain parallel when the four prepared, on the subterranean waters (*loc. cit.*), the sun-ship for its course on the upper celestial ocean, or when they were associated with its parallel, the ferry-boat of the Styx which led to the realm of Osiris and of the dead. This role would allow us to find an easy connection with the Deluge story, see, however, *op. cit.,* p. 76, for the so far very scanty traces of the Deluge tradition in Egypt. Otherwise also their various associations with the winds could suggest such a fancy—e. g., some people might find even an allusion to the Deluge in a passage in the Pyramid Texts which calls the four genii the protectors of the defunct souls against storms. We find them, however, in general as guardians of all dangerous forces of nature. Later, e. g., when the ocean became an evil force, standing in opposition to good Osiris who once had represented the sea (see above), we observe various attempts (*op. cit.,* pp. 104ff) to make those four gods in a new sense the guardians of the source of all waters, i. e., they hold down the Satanic water-dragon who lies in the depths of the world (like the Biblical Leviathan). This monster, ascending from its subterranean, dark layer, can manifest itself also in storm or rain, so the last-mentioned role of the four good genii as guardians can be reconciled with their celestial guardian functions mentioned above. The very early mention of their constraining the monster serpent "Overturner of Souls" (*Neheb-kau*) which, in the depths of the earth, waylays and swallows the souls of the dead wandering to the realm of Osiris, is different from that function mentioned last, but once more it reveals their beneficent nature and their general activity as guardians wherever the world needs any watching. Without question their number aided those speculations, four being the most important cosmic number, as is especially clear in Egyptian mythology. They could also be united into one great cosmic force, e. g., these "four spirits (i. e., manifestations) of Horus" are clearly identical with the four-faced Horus (*op. cit.,* pp. 388, 394). The representation of this manifestation of the higher world shows the hawk-head of Horus, the sky-god, quadrupled to indicate the origin of that "quadrinity." When it is separated into four persons the pictures show these either all with human heads (*op. cit.,* Fig. 89, mostly thus in earlier time, e. g., as guardians of the embalmed), or with four varied heads: one human, one of a hawk, one of a baboon, one of a jackal.[41] We see their great importance; no corresponding group of three can be found in Egypt.

Now it seems very plausible that at least the idea of four divine guardians was borrowed by the Hebrews from Egypt. Ezekiel's vision of the four Cherubim (Ez. i. 5ff) clearly betrays the influence of those Egyptian representations. The bodies of the four angels there are those of men (verse 5) and four human hands are hidden under their four wings (verse 8); only the prophet does not dare to break entirely away from the popular conception of the Cherubim as having the bodies of winged bulls, and describes, at least, the soles of their feet as of "a calf's foot." How to depict such a combination remains a problem, but we must not be too critical toward a vision. The legs, however, cannot have been conceived simply as bull's legs; they "were straight feet," a remark which may remind us of the strange, mummy-like stiffness of most Egyptian representations of those four genii (see below). This detail may remain undecided, but the four faces of Ezekiel's angels correspond approximately with the Egyptian models: man, lion, ox, and eagle. The substitution of the lion's head for that of the baboon can easily be explained; the latter is no Palestinian animal and, in rough drawing, the profiles of both animals look very much alike. Only in the substitution of the ox for the Egyptian jackal the Hebrews have taken a liberty. This, however, seems likewise easy to account for, less by an interpretation of the long, pointed jackal-ears as horns than by referring back to the above-mentioned popular conception of the Cherubim as bulls. The bull's head, it seems, takes thus the place of the least dignified type among the animal faces.

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[41] Cp. *op. cit.,* p. 111, Fig. 114, and p. 112, Fig. 116 (where we observe how easy it was to unite those four heads on one neck).

The signification of the Hebrew Cherubim corresponds fairly well to that of the "sons of Osiris." As the foremost angels they are, of course, according to Hebrew ideas "sons of God" (cp. Job i. 6, etc.), like the Egyptian genii. Then the Cherubim appear principally as guardians commissioned by God, to begin with, to watch the entrance to the garden of Paradise (Gen. iii. 24). We know how many Oriental monuments represent monsters of the Cherubim-Seraphim character guarding the water, the flower, the tree of life, in close analogy to the Egyptian ideas shown above. Standing as guards near the throne of God Himself, the Cherubim correspond perfectly to the children of Osiris when these guard thus their father. There is only one difference: we have no direct Egyptian counterpart for God's riding on the Cherubim when he manifests Himself in the storm. The Egyptian four genii always stand solemnly still; as guardians they do not walk or fly. And yet they come near the above Cherubim idea as bearers of the sky on which the throne of God rests according to Egyptian as well as Hebrew thought; they approach it even more closely in that repeatedly recurring, though not always very clearly understood connection with the winds, especially the storm-winds. From this it is but one step to the Hebrew description of Yahveh riding on the storm. We must bear in mind that, with the only exception of the malevolent character Seth, the gods of almost rainless Egypt did not appear on the storm-winds and storm-clouds like many Asiatic gods. The least important analogy may have been the number four of the Cherubim and the archangels (*Book of Enoch*, XL, 2; Rev. vii. 1, 11, etc.) because this cosmic number can easily be obtained independently; still, it must not be neglected in the present connection. The discovery of parallel motives in Asiatic mythologies[42] will probably necessitate only a slight modification of the above remarks.

Thus we come to the conclusion that some variants of the Flood myth assuming four sons of the hero ought to have existed in Palestine. It is difficult to decide whether the Koranic story was based on an authentic older tradition or on a fancy which accidentally fell into the correct ruts of older mythological thinking. If it rested entirely on Gen. ix. 22-27, then we surely have a path leading to an earlier form of the Noah myth. A close examination of that desperate Biblical passage will lead to the result that it is indeed easiest to assume from it a fourth son, called Canaan, for the earlier form of the Noah story. Whether he was originally the youngest son seems questionable, he ought to have held a better or even the best place at the time when the Hebrews, who always called their land Canaan and their language "the tongue of Canaan" were not yet ashamed to call themselves Canaanites. That is what we should expect from those parallel usages. It seems that only later theological theories, based on the Joshua stories, separated the heathen Canaanites as a different and inferior nation from the Hebrews. Then it became necessary indeed to make Canaan the youngest son, i. e., the least important, as is done in Gen. ix. 24. That difficult passage in Gen. ix, has led to the wildest apologetic efforts, such as explaining away the expression "the youngest son" by treating the adjective as the comparative "the younger," i. e., Ham whom the constant arrangement of the three sons (v. 32; vi. 10; vii. 13; ix. 18—all P.) always mentions as the second son is declared to be compared only with the first-born, a makeshift which is quite inadmissible grammatically. The difficulty that Ham commits a sin while his son, Canaan, is cursed for it, is poorly harmonized with Gen. x. 6 by the apologists of the old school as a punishment of the father in his son. Some of the most modern critics, on the other hand, draw from that curse of Canaan in the poetical passage, verses 25-27, the conclusion that the three sons were, originally, Shem, Japheth, Canaan, the later substitution for Canaan, i. e., Ham, having been worked into verse 22 and then harmonized with Gen. x. 6. Assuming that the text has been changed repeatedly in favor of the later prevailing theory of Shem, Ham, Japheth, and that only those three verses have been kept intact by their poetical form, I should still rather find in these a trace of Canaan as standing independent by the side of the three brothers.[43]

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[42] We may compare here what Alfred Jeremias, *op. cit.*, p. 225, has compiled (after Zimmern in *K. A. T.*,^{3} p. 542, and Gunkel, *Genesis*, p. 241) of Babylonian and Jewish speculations about the four eons and the fourfold revelation accompanying the beginning of each eon opened by a great teacher. These analogies to Osiris accompanied by his four manifestations and to a supposedly similar Noah are very remarkable, but we do not yet understand them sufficiently. Cp. Zimmern, *K. A. T.*,^{3} p. 536, on the most complete Babylonian tradition of a great divine revelation by the four mysterious beings Euedokos, Eneugamas, Eneubulos, Anementos. After the analogy of the Oannes myth these four teachers of divine knowledge probably emerged from the bottom of the sea, in perfect parallelism with some explanations of the Egyptian four genii.

A clear restoration of the whole story is, of course, hardly possible after the rigorous adaptations to the later number of Noah's sons. Among these adaptations I count verse 23, although remarkable old mythological motives appear there. The face turned backward is one of the principal characteristics of Orion, as has been amply shown above. Here a new explanation for this abnormality is given, namely decent shame. A garment hanging down from the hand is another characteristic of the same type. The object Orion holds in his left hand is often explained as a spotted skin or embroidered garment (Joseph's coat, etc.), and this explanation seems to be more primitive than that as a shield of spotted hide—a theory we can trace back to 1400 B. C. in the Canaanitish Resheph type (also reproduced by the Egyptians). These explanations of that mysterious object lead, as is well known, to very interesting speculations, e. g., to the comparison of Orion with his counterpart or consort Virgo who sometimes is thought to be holding a similar skin or garment taken from the hero,[44] or to the story that Orion's left hand is wounded and therefore wrapped up in that piece of cloth or skin. The latter motive finally produces the myth of the one-handed hero, most clearly preserved in Teutonic mythology. So we recognize here the stellar picture of Orion standing over the Osiris-like "restful" god, who lies in the chest Argo, and trying to hide, with some peculiar garment, the very manifest phallus of the latter.[45] Then the idea of the double Orion is used in order to group two of Noah's sons together, as a parallel to the two wives, sisters, or daughters associated alternatively with one of the two divine and astral types under discussion (see above on these types and their motives). Here that interesting piece of mythology seems to show that the rest of Noah's family was treated as one son; the contrast of two pairs is less probable.[46] As said above, the isolated motive of three sons, therefore, seems to be rather old with the Hebrews. It may, nevertheless, have originated by excluding an unworthy son from the family and the ark (although in Gen. ix, the bad behavior of one son manifestly is assumed after the Flood). So the later recognized version or versions of the Flood story may at first have separated the three good sons from the fourth and may then, still later, have thought it worth while to mention only these. It is not advisable to supplement the details of such versions from the Koranic tradition. In making the fourth son perish because of lack of faith it betrays too late a religious development to harmonize it with the oldest myths; only the number of the sons deserves our attention.

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[43] According to this theory we may also risk to assume, with some degree of plausibility, that in the original form of the Biblical table of nations, Canaan's descendants formed an independent family, side by side with the Hamites and Semites. This would, of course, be much more reasonable than the present incomprehensibility of classifying the Canaanites with the descendants of Ham (Gen. x. 6). The excuse of liberal apologists, that ethnology is too young a science to expect in that Hebrew system in Gen. x, has some truth in it and holds good in other cases, but a group like the more or less dusky Africans should have been easily distinguished even by the most primitive observer of ancient times. This possibility that the Canaanites, as long as the Hebrews confessed to belong to them, may have formed the fourth (?) and smallest group of nations, going back directly to a son of Noah, is of course not apparent in the present form of Gen. x.

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[44] Cp., e. g., Potiphar's wife, a strict type of dangerous Astarte-Virgo, holding that many-colored coat of Joseph's, or Deïaneira, holding the garment poisoned by Nessus, etc.

[45] See above on the motive of ithyphallism. Another explanation of the skin in Orion's hand seems to be given in the story how Jacob, the plainest of all Biblical Orion types, deceived his blind father with kid-skins drawn over his hands. On the motive of one of two rivaling heroes being blind, especially one a double of Orion, see above on Lamech.

Our fancy has here full sway rather in discovering connections with endless mythological motives. Let us then bear, above all, this in mind, that regarding the number of persons present in Noah's ark or forming his family, probably more variants existed than indicated here. The mythologies of other nations furnish many such variants, from a single survivor or a married couple too old to beget children in the natural way (so as to have to create offspring by some miracle—thus occasionally betraying again the original divine nature of the Flood hero) to as numerous a crew of the ship as, e. g., the Babylonian epic assumes. The prevalence of one version or certain versions in one country never excluded completely the knowledge of others. Let us remember that Israel, before the complete victory of the monotheistic principle, possessed as rich a mythology as any heathen nation. Even the scanty and mercilessly expurgated fragments in which the earliest Hebrew traditions have come down to our time, betray this former wealth. How must it have flourished when the worship of Adonis-Tammuz was as public and as intensive as even as late a writer as Ezekiel (viii. 14) witnessed it! Therefore we must not be surprised at finding the kaleidoscopic character of all mythologies also in the traditions of Genesis.[47] Still less surprising ought to be the result that the patriarchs, as representatives of the mythical age when God (or the gods) still walked the earth, were all originally characters very different from the pale types of medieval saintly legends which the Sunday-school teacher must now force upon them.

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[46] For the theory that Noah had indeed four children, but two sons and two daughters, the analogy of Œdipus could be adduced. He is the plainest of all Orion types in Greek mythology, slaying his own father, limping, blind in his old age, being led by his two daughters, while his two sons betray their nature by slaying each other just as the heavenly twins do so often. Of course, it is not impossible that versions existed according to which Noah had two good sons and two shameless sons, or, more probably, daughters. Especially the latter myth could be read easily in the stars. Only we should have to assume stronger mutilations of the text in Gen. ix than we have done so far.

M. MILMAN.

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[47] This essay was written without having E. Stucken's *Astralmythen* at hand. I regret not to be able to state how far my remarks on stellar motives run parallel with the results of that important pioneer work. I hope, however, that some of these remarks will prove to be independent steps on the paths opened by Stucken.

THE CHILD IN LUKE i. 76.

THE Magnificat of Elisabeth (Luke i. 46-56)[1] and the Benedictus of Zacharias (Luke i. 63-79) were not composed by St. Luke, as Harnack supposed,[2] but represent Hebrew psalms inserted by the compiler of the two Judeo-Christian chapters prefixed to the Third Gospel.[3] These legends on the birth of John the Baptist and the Nativity of Christ were written in Hebrew or Aramaic, and the old hymns were inserted in their original Hebrew text and translated into Greek when the first two chapters were Grecized. Wellhausen begins his translation of Luke with the third chapter, just as his translation of the First Gospel disregards the first two chapters.[4]

The compiler may have added verse 70, *As He spake by the mouth of His holy prophets which have been since the world began*; he may also have prefixed *nabî*, prophet, to *'elyôn*, supreme, in verse 76, *And thou, O child, wilt be called the prophet of the Highest*. The original text, it may be supposed, was simply: *wĕ-attâ hay-yéld 'elyôn* sists of three triplets with 3 + 3 beats in each line,[10] should be translated as follows:

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[1] This hymn is not a song of the blessed virgin Mary; see *Encyclopædia Britannica*, 11th ed., Vol. 17, p. 811; *cf.* my paper "The Prototype of the Magnificat" in *Zeitschrift der Deutschen Morgenländischen Gesellschaft*, Vol. 58, p. 617.

[2] See notes 3 and 9 to my paper cited in the preceding note.

[3] Cf. Hermann Usener's article on the Nativity-Narratives in Cheyne-Black's *Encyclopædia Biblica*, cols. 3342, § 3, and 3347, § 13. Alfred Plummer on p. 7 of his commentary on St. Luke (in the *International Critical Commentary*) thinks that the Virgin Mary may have been the writer of the documents used in the first two chapters.

[4] Wellhausen, *Das Evangelium Lucae* and *Das Evangelium Matthaei* (Berlin, 1904).

1 The stump of Jesse has sprouted,
a shoot grows up from its roots;
2 Upon it will rest JHVH's spirit,
a spirit of wise discernment,
A spirit of counsel and valor,
a spirit of reverent awe.[11]

JHVH will endow the Davidic scion with wisdom and discrimination, he will be a statesman and a warrior, and a devout worshiper of JHVH; so he will be worthy of the throne of David, and he is the legitimate heir and well-armed to defend his claims:

5 His hip-girdle will be Right,
and Troth the belt of his loins;
3 He'll not judge a cause at first blush,
nor decide a case at first ear,
4 But his mouth will smite the ruffian,
his lips will slay the wicked.

His rule will be firm, but just, so that every one will feel secure, even the weakest and most helpless of his people will be safe. If any one should try to injure an orphan or a young child, he will not succeed:

8 At the asp's hole sucklings will play,
and weanlings at the den of the viper;
6 The wolf will lodge with the lamb,
the leopard lie down with the kid,
Young lions and fatlings will be comrades;
a young boy will be their leader.[12]

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[10] Each line comprises two hemistichs, and each hemistich has three beats. For typographical reasons the two hemistichs of a line are printed, not in one line, in two columns, but in two lines. Cf. note 117 to my paper "Was David an Aryan?" in No. 753 of *The Open Court*, February, 1919, p. 96.

[11] The Hebrew word *knowledge* denotes also *consideration*, regard, respect, reverence.

[12] Cf. pp. 24 and 161 of the translation of Isaiah in the Polychrome Bible. The words omitted in the present translation represent secondary additions. The Hebrew text (with all glosses) of this and the following poems will be published in Vol. 40, pp. 64-75, of the *American Journal of Philology*.

This zoological imagery must not be interpreted literally. Jesus says: Beware of the false prophets who come to you in sheep's clothing, but inwardly they are ravening wolves (Matt. vii. 15). He called the Scribes and Pharisees *serpents and brood of vipers* (Matt. xxiii. 33). In Ps. xxii, the first three heptastichs of which may have been composed after the death of Judas Maccabæus in 161, while the last two may have been added under the reign of John Hyrcanus, about 130, the Maccabean poet says:

16a Many dogs have surrounded me,
13a showing their teeth and sinking
16c Their fangs in my hands and my feet[13]
13b like a ravening, roaring lion.[14]

This should follow the opening lines:

1 My God, why didst Thou forsake me?
far from my cry art Thou;
2 Daily I cry to my God,
e'en at night I have no pause.[15]

The dogs (or sleuths) are the agents of Antiochus Epiphanes searching for copies of the Law and hounding all faithful Jews who refused to obey the king's order to abandon the religion of their fathers. In verse 12 we find:

12 Many steers have encompassed me,
bulls of Bashan encircled me.

The Romans called the elephants of Pyrrhus's army *boves Lucae* or *Lucani,* bulls of Lucania (Plin., VI, 16). The *bulls of Bashan* allude to the elephants sent with the Syrian army against the Maccabees.[16] On the other hand, Amos the gloom in both passages referred to the Babylonian Captivity. The Jewish exiles, who have lived in the gloom of the Babylonian Captivity, have followed the meteoric career of Cyrus who has given them permission to return to Jerusalem. The morning of redemption has dawned upon them. Their sufferings are over, their mouths are filled with laughter, their tongues with shouts of joy (Ps. cxxvi. 2). They gratefully apostrophize Cyrus:

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[13] This hemistich has often been misinterpreted as referring to the crucifixion of Jesus.

[14] See *Johns Hopkins University Circulars,* No. 163, p. 56, note 17; *American Journal of Semitic Languages,* Vol. 23, p. 232, note 36; Haupt, *Biblische Liebeslieder* (Leipsic, 1907), p. 121, note †.

[15] See the abstract of my paper on "The Last Words from the Cross" in *Journal of the American Oriental Society,* Vol. 37, p. 21, below.

[16] See my explanation of Ps. lxviii in *American Journal of Semitic Languages,* Vol. 23, p. 235, note 45.

3 Thou hast increased exultation,
hast given great joy;
They joy over thee[20]
as men joy in harvest.[21]

4 For the yoke they had to bear,
and the bows they had to shoulder,[22]
The rod of the driver—
them thou hast broken.[23]

The Babylonian Captivity is ended, the Chaldean dominion is destroyed. JHVH has severed the cords of the wicked (Ps. cxxix. 4). Quelled are the jeers of the proud, the contempt of the arrogant (Ps. cxxiii. 4). Our soul has escaped like a bird from the fowler's clap-net; the net is broken, and we are free.[24] There will be an era of universal peace. Nation will not lift sword against nation, neither will they learn war anymore. They will beat their swords and spears into peaceful hoes.[25] All armor will become useless:

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[20] Lit. *before thee.* In Assyrian *to rejoice before a person* means *to welcome him.*

[21] The words omitted represent secondary additions; cf. above, note 12.

[22] In European yokes the bows enclosing the necks of the animals are fastened above the cross-bar or body of the yoke, whereas Oriental yokes are open below and are fastened under the necks of the oxen with cords or thongs; see the cuts in the translation of Ezekiel in the Polychrome Bible, p. 169, and col. 7022 of the *Century Dictionary*; cf. *Journal of Biblical Literature,* Vol. 36, p. 252.

[23] For the correct interpretation of this couplet see *Journal of Biblical Literature,* Vol. 32, p. 113, note 23.

[24] See Pss. cxxix. 4; cxxiii. 4; cxxiv. 7.

5 Every clanking shoe[26]
and cuirassed corselet[26]
Will go to the smelter
to feed the fire.[27]

This era of peace will see the restoration of the national independence of the Chosen People. We have now a legitimate heir to the throne of David, Zerubbabel, the new-born grandson of King Jehoiachin of Judah, who will prove a worthy successor to his famous ancestor:

6 A child is born to us,
a son is given us,
On whose head there will be
the crown of sovereignty.[28]

He will restore the national independence of Judah and sit on David's throne. He will be not only a wonderful counselor, but also an *êl-gibbôrîm,* a leader of warriors, i. e., a statesman-warrior like the Duke of Wellington whom Lord Tennyson called in his ode on the death of the Duke in 1852:

Great in council and great in war,
Foremost captain of his time.[29]

But he will also be a father of his people and a prince of weal. His reign will inaugurate a new era of peace and prosperity. The poet predicts:

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[25] See the Maccabean passage Mic. iv. 3; cf. Haupt, *The Book of Micah,* p. 12.

[26] The clanking shoe is a warrior's shoe provided with greaves protecting the front of the legs below the knee, and the cuirassed corselet is a buff-coat with a breast-plate and a back-piece; see Delitzsch and Haupt, *Beiträge zur Assyriologie,* Vol. 3, p. 174, lines 14 and 17, and the cut on p. 185; cf. Vol. 6, Part 1, p. 99, line 8; p. 100, line 14.

[27] See Haupt, *The Book of Micah,* p. 51, note 30; *Journal of Biblical Literature,* Vol. 35, p. 283.

[28] See *Journal of Biblical Literature,* Vol. 32, p. 113, note 23.

[29] See the conclusion of my paper on Heb. *mô'éç,* counsel, in *Journal of Biblical Literature,* Vol. 37.

They'll give him the names[30]
  Wonderful Counselor,
Captain, Father of the Flock,
  and Prince of Weal.

7 Weal without end!
  he'll increase the dominion
Beyond David's throne
  and beyond his kingdom.

His dominion will be more extensive than the kingdom established by the founder of the Davidic dynasty. Zerubbabel will be *malkî-çédq*, the legitimate king, the rightful ruler. His throne will be based on his legitimate claims, and it will be supported by his just reign, firmly established for all time to come. Therefore the poet concludes:

He'll establish it with justice
  from henceforth for ever.
The zeal of JHVH
  will carry this out.

This prediction may seem extravagant, but with God all things are possible (Matt. xix. 26). If it be marvelous in the eyes of the remnant of this people in these days, should it be also marvelous in mine eyes, says JHVH Sabaoth (Zech. viii. 6). If the Davidic dynasty were not restored, it would be a stain on JHVH's honor, and JHVH is solicitous for His honor. He will aid us for the sake of the glory of His name, lest the heathen say, Where is their God?[31]

Now, if we restore the Hebrew original of the Benedictus in Luke i. 68-79, we obtain two stanzas with the same meter as in Is. ix. 2-7, and, as in the patriotic poem in Is. ix, the first stanza refers to the Babylonian Captivity, and the second to the new-born Davidic scion Zerubbabel. The form of the Magnificat, on the other hand, resembles the poem in Is. xi. 1-8: both consist of three triplets; but while the lines of the poem in Is. xi have 3 + 3 beats, the lines of the Magnificat are elegiac pentameters (with 3 + 2 beats).[32] The Magnificat is much later than the Benedictus: the former is a Maccabean psalm, while the Hebrew original of the Benedictus is one of the earliest psalms, written at the end of the Babylonian Captivity. There are no pre-Exilic psalms.[33] The oppression of JHVH's servants,[34] referred to in the Magnificat, is the Syriac persecution, the victory He gained with His arm alludes to the Maccabean victories, the proud He scattered are the Greeks, the rulers whom He hurled from the thrones are the kings of Syria, e. g., Antiochus V Eupator in 162 and Demetrius I Soter in 150, and the lowly whom He exalted are the Jews: the stone which the builders rejected became the keystone (Ps. cxviii. 22).[35] Weiss's (cf. above, note 19) view that the potentates may allude to Pilate and Herod Antipas, and that the proud may be the members of the Sanhedrin, especially the high-priestly family of Annas and Caiaphas, is not satisfactory.

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[30] Lit. *his name will be called*. The phrase *to be called* is often used in Hebrew in the sense of *to be*; see *Journal of Biblical Literature*, Vol. 34, p. 46. For *Heaven did not exist* the Babylonians said *Heaven was not called* or *had no name;* cf. R. W. Rogers, *The Religion of Babylonia and Assyria* (New York, 1908), p. 107.

[31] See my explanation of the penitential psalm *De Profundis* in *Hebraica*, Vol. 2, p. 100, note 5.

The original form of the Magnificat may be translated as follows:

46 My soul magnifies JHVH,
49b holy is His name;[36]
48a For He noticed His servants' oppression,
46b and my spirit rejoiced.
50 His mercy is on those who fear Him
from generation to generation.

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[32] See note 21 to my paper "The Son of Man" in *The Monist*, January, 1919, p. 130.

[33] See my paper "Was David an Aryan?" in No. 753 of *The Open Court*, February, 1919, p. 94.

[34] Τῆς δούλης αὐτοῦ in Luke i. 48 is an editorial adaptation for τῶν δούλων αὐτοῦ.

[35] See Haupt, *The Book of Micah*, p. 33, note 16.

[36] It is necessary to transpose the second hemistichs in verses 46-49, and verse 50 should precede verse 49.

49 Great things did Shaddai[37] to me,
48b generations will bless me.
51 With His arm He gained the victory,
He scattered the proud;
52 From their thrones He put down potentates,
and exalted the oppressed.

53b The rich He sent away empty,[38]
53a filled the hungry with good things.[39]
54 He helped His servant Israel,
not forgetting His mercy,[40]
As He had promised unto our fathers,
Abraham and his seed.[41]

This hymn may have been composed under the reign of the Maccabee Simon (142-135). The prototype of the Magnificat, on the other hand, the so-called Song of Hannah (1 Sam. ii. 1-10) refers to Zerubbabel: he is the anointed whose horn JHVH exalts, the king to whom JHVH imparts strength, whose foes He will shatter. JHVH will restore the Davidic kingdom and repeople Jerusalem. He can make a barren woman (Judah) bear seven,[42] while a fruitful mother (Persia) withers.[43]

From dust He raises the lowly,
from the ash-heap He lifts up the needy,

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[37] Shaddai is an epithet of JHVH; the original meaning may be *mountain-god;* cf. 1 Kings xx. 23 and 28.

[38] Cf., e. g., 2 Macc. iii. 28; iv. 26, 42; v. 7; viii. 11, 25, 36; 1 Macc. xv. 31; xvi. 8.

[39] See my explanation of Ps. xxiii in *American Journal of Semitic Languages,* Vol. 21, p. 136; cf. 1 Macc. iv. 56; 2 Macc. x. 6.

[40] From the Hebrew point of view, it would be more accurate to translate: *He did not forget His mercy, helping His servant Israel.* For *He made creating* we find in Hebrew *He created to make* (Gen. ii. 3) and the phrase *He spake saying* really means *He said speaking*; see *Journal of Biblical Literature,* Vol. 34, p. 71, below; cf. below, note 46.

[41] The words omitted represent secondary additions; cf. above, note 12.

[42] Cf. Zech. viii. 4; *Journal of Biblical Literature,* Vol. 32, p. 107, line 7, and p. 110, line 1. *The houses were not builded* (Neh. vii. 4) means *the families were not large*; see *Johns Hopkins University Circulars,* No. 114, p. 108.

[43] Cf. the remarks on the rebellions in the provinces of the Persian empire after the assassination of Pseudo-Smerdis (522) at the beginning of my paper "The Visions of Zechariah" in *Journal of Biblical Literature,* Vol. 32, p. 107.

And makes him sit among nobles,
and glorious thrones he inherits.[44]

Jerusalem was an ash-heap after the catastrophe of 586.

The tone of the Song of Hannah as well as of the Magnificat and the Benedictus is national rather than individual, and all three hymns are manifestly incongruous to the situation they are supposed to illustrate, although the compiler of the Judeo-Christian legends prefixed to the Third Gospel made some changes in the original text of the Benedictus: apart from the insertion of *nabî,* prophet, before *'elyôn,* supreme, which spoils the rhythm, and the other changes alluded to above, he changed the pronominal suffixes in the second line of verse 76. The original text, it may be supposed, was: Thou'lt walk before *us* to clear *our* ways, i. e., Thou wilt lead us in removing all obstacles hindering the restoration of the Davidic kingdom. This was changed to Thou'lt walk before *Him* to clear *His* ways, and finally *the Lord* (or JHVH) was substituted for *Him,* an expansion which we often find in the Old Testament.

The original form of the Benedictus may be translated as follows:

68 Blessed be JHVH,
the God of Israel,
Who has looked on His people,
and sent it redemption,
69 And raised for us
a horn of deliverance[45]
71 From the power of our foes,
from the hand of our enemies,
74 To set us free and permit us
to serve Him without fear.[46]

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[44] See the translation of the Song of Hannah on p. 621 of my paper cited above, in note 1.

[45] The words omitted represent secondary additions; cf. above, note 12.

[46] Here again it would be more accurate to translate: *He set us free and permitted us to serve Him without fear, raising for us a horn of deliverance from the power of our foes, from the hand of our enemies*; cf. above, note 40.

The redemption is the termination of the Babylonian Captivity; the horn of deliverance is Cyrus;[47] the foes are the Babylonians.[48] In the second pentastich the patriotic poet hails the new-born Davidic scion Zerubbabel who seems to have been born at the time when Cyrus gave the Jews permission to return to Palestine. The poet says:

76 And thou, O child,
wilt be called[30] exalted,
Thou'lt walk before us
to clear our ways.

78 Through our God's mercy
the dayspring has looked on us,
79 To bring light to the tenants
of darkness and gloom,
And guide our steps
to the path of weal.[49]

The child apostrophized in the Benedictus is not John the Baptist, but Zerubbabel, the grandson of the last legitimate king of Judah, who rebelled against Darius Hystaspis in 519 and was probably put to death, perhaps crucified.[50]

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[47] The Zionists may call President Wilson a *horn of deliverance.*

[48] According to Weiss (cf. above, note 19) the foes are the Romans; see *op. cit.*, Vol. 1, p. 421, *ad* 72.

[49] The second stanza is not a Christian addition to an original Jewish Messianic song; cf. *Journal of Biblical Literature,* Vol. 21, p. 50, and note 6 to my paper cited above, in note 1.

[50] Cf. Hastings' *Dictionary of the Bible,* Vol. 4, p. 979; Cheyne-Black, *Encyclopædia Biblica,* col. 5413; Critical Notes on Isaiah, p. 198, in Haupt, *The Sacred Books of the Old Testament in Hebrew*; cf. above, note 5.

CRITICISMS AND DISCUSSIONS.

PANDIAGONAL MAGICS OF ORDERS 6 AND 10 WITH MINIMAL NUMBERS.

In *The Monist,* Vol. XXII, p. 304, appeared an article by Messrs. Andrews and Frierson on magic squares of orders $\equiv 2 \pmod{4}$ based on information transmitted by me, as referred to in the second and other paragraphs of their paper.

It may possibly be inferred from this article that squares obtained by the methods described contain the lowest groups of numbers with which pandiagonal squares of the respective orders can be constructed. Also in a following paper by Mr. Sayles, *loc. cit.,* p. 472, this suggestion is apparently taken for granted. It was not my intention, however, that any such inference should be drawn. It is true that the groups of numbers chosen are the lowest with which such squares can be constructed by the path method or by any of the allied forms of procedure; but I have long been aware

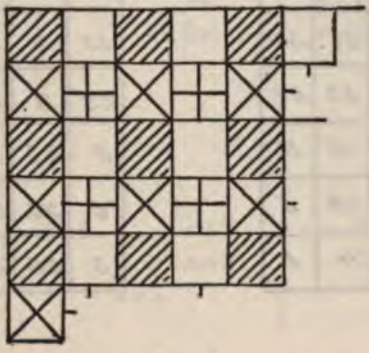

Fig. 1.

that such squares may be made with much lower groups, only in these cases the squares will be irregular, non-La Hireian, and must be approached by special tactic.

It is known that magic squares of order $\equiv 2 \pmod{4}$ made with consecutive numbers cannot be pandiagonal; but I believe that no rigorous proof of the fact has yet been published. The following is quite satisfactory.

39	37	4	10	13	17
35	34	7	12	14	18
32	29	9	15	16	19
21	24	25	31	11	8
22	26	28	33	6	5
23	27	30	36	3	1

Fig. 2.

Take a square lattice of any even order $2m$ and make a double chequer of its cells as shown in Fig. 1, where there are four species of cells symmetrically disposed. Suppose this lattice filled with the first $(2m)^2$ natural numbers so that it is magic on all rows, columns, and diagonals. The mean number is $(4m^2+1)/2$ and the magic sum is $m(4m^2+1)=\Sigma$. Let the sum of the numbers in all the shaded cells $=$A, in all the blank cells $=$B, and in all the cells with diagonals drawn $=$C. Then by summing all the numbers in

39	36	30	21	23	32
35	26	24	27	31	34
29	25	22	28	33	37
3	7	12	18	15	11
6	9	13	16	14	5
8	17	19	10	4	1

Fig. 3.

39	17	13	10	4	37
35	7	12	18	14	34
29	9	19	16	15	32
8	25	24	21	31	11
6	26	22	28	33	5
3	36	30	27	23	1

Fig. 4.

the 1st, 3d, 5th, etc., rows, we have $A+B=m\Sigma$. Similarly by summing the 1st, 3d, etc., columns $A+C=m\Sigma$, and from the alternate / diagonals $B+C=m\Sigma$. These three equations yield $A=B=C=m\Sigma/2=2m^4+m^2/2$. The assumed square cannot therefore exist when m is odd, for then $m^2/2$ would be fractional. It will be noticed that we have only made use of the / diagonals, so that a square of order $\equiv 2 \pmod{4}$ cannot even be 1/2 pandiagonal using consecutive numbers. The same result also follows for associated squares, for if an associated square of these orders existed it could be transformed into a pandiagonal by the $A-D$ method.

If m is odd, what is the lowest group of integers with which the square of order $2m$ can be magic and associated? Clearly unity must be one of the group, for otherwise by diminishing every number in the finished magic by unity, we could secure the result with a lower group of numbers. Let t be the highest integer in the group; then the mean number is $(t+1)/2$, and the magic sum $\Sigma=m(t+1)$. Since the square is associated it can always be transformed to a pandiagonal and from the above investigation we have $A=B=C=m\Sigma/2=m^2(t+1)/2$. Since m is odd, $t+1$ must be even and therefore t odd, say $t=2x+1$. If we now write down the complementary couplets and their half differences, we have:

1	$2x+1$	x
2	$2x$	$x-1$
3	$2x-1$	$x-2$
.	.	.
.	.	.
.	.	.
.	.	.
.	.	.
$x-1$	$x+3$	2
x	$x+2$	1
$x+1$		

and evidently if the square is to be associated, the middle number of the group $x+1$ must always be omitted. By the method of Complementary Differences[1] we have to form m equations using $2m^2$ of the half differences, each once and once only. It follows that the sum of the half differences used must be even, for the m

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[1] See *The Monist,* Vol. XX, p. 434.

equations separate the $2m^2$ numbers into m sets, the sum of each set being even. But the sum of all the half differences from 1 to x is $x(x+1)/2$, and this is odd when $x \equiv 1$ or $2 \pmod{4}$, but even when $x \equiv 0$ or $3 \pmod{4}$. In the former case the sum of the $x-2m^2$ half differences which have to be omitted must be odd, and in the latter case their sum must be even.

Consider the simplest case, $m=3$, i. e., order 6. If $t=37$, $x=18 \equiv 2 \pmod{4}$ and the sum of the half differences is therefore odd, and since no half difference can now be omitted, the construction is impossible. If $t=39$, then $x=19 \equiv 3 \pmod{4}$ and the one half difference to be omitted must be even. Thus we have to omit the mean number 20, and the one complementary couplet corresponding to any one of the 9 even half differences from 2 to 18 inclusive. The necessary equations can always be found, as the following table shows, so that there are exactly nine ways in which we can choose 36 from among the first 39 natural numbers to form an associated magic square of order 6.

		HALF DIFERENCES
1	39	19
2	38	18
3	37	17
4	36	16
5	35	15
6	34	14
7	33	13
8	32	12
9	31	11
10	30	10
11	29	9
12	28	8
13	27	7
14	26	6
15	25	5
16	24	4
17	23	3
18	22	2
19	21	1
20		

From these equations the nine associated squares may be obtained, and each of them can be transformed to a pandiagonal square by the A – D method. The magic sum is always 120, but the last case (half difference 18 omitted) is the most interesting because it contains only two numbers > 36; all the others containing three such numbers, this case will be used in illustration. Fig. 2 gives the distribution of the numbers in rows, Fig. 3 that in columns,

39	17	13	37	4	10
35	7	12	34	14	18
29	9	19	32	15	16
3	36	30	1	23	27
6	26	22	5	33	28
8	25	24	11	31	21

Fig. 5.

38	16	12	36	3	9
34	6	11	33	13	17
28	8	18	31	14	15
2	35	29	0	22	26
5	25	21	4	32	27
7	24	23	10	30	20

Fig. 6. $\Sigma = 114$.

1	4	9	10	11	101	99	98	96	91
7	16	18	19	20	92	90	89	87	82
21	26	27	28	30	81	80	79	75	73
32	35	37	39	40	71	70	68	66	62
41	45	47	48	51	61	60	58	55	54
50	49	46	44	43	53	56	57	59	63
42	38	36	34	33	64	65	67	69	72
31	29	25	24	23	74	76	77	78	83
22	17	15	14	12	84	85	86	88	97
13	8	6	5	3	93	94	95	100	103

Fig. 7.

in Fig. 10 by unity we get a pandiagonal magic of order 10 with zero allowed and only one number > 100.

If we choose higher values of t, the number of selections is largely increased. In the case of order 6, if we go up to $t = 41$, we have $x = 20 \equiv 0$ (mod. 4) and the sum of the two half differences to be omitted must be even: that is, both must be even or both odd. We can select them in ninety different ways, but in one sense these will not all be fundamentally new selections, because in the nine cases where we take 20 as one of a pair of even half differences, we exclude the numbers 41 from the finished square so that the contained numbers extend from 2 to 40, and if we then diminish all of them by unity, we get the nine cases already enumerated when $t = 39$. Indeed if we stipulate that unity must always be included in the final square the enumeration for any value of t includes that for all lower values. Thus if $t = 49$, then $x = 24 \equiv 0$ (mod. 4) and the six half differences excluded must have an even sum, so that they must include an even number of odd half differences, viz., 0, 2, 4, or 6. The enumeration is therefore $2(12\,C0 \times 12\,C6 + 12\,C2 \times 12\,C4) = 67{,}188$, which is the number of different ways in which 36 suitable numbers can be selected from the first 49 on the understanding that unity must always be included.

4	0	34	5	30	35
10	28	29	11	3	27
14	23	20	12	18	21
31	6	1	32	36	2
25	33	9	26	8	7
24	18	15	22	13	16

Fig. 11.

It happens by chance that in all the cases so far illustrated $x \equiv 0$ or 3 (mod. 4), so that the sum of the omitted half differences has always to be even; the first case of the opposite kind with order 6 occurs when $t = 43$. We have then $x = 21 \equiv 1$ (mod. 4) and the sum of the omitted half differences must be odd, that is, all three odd, or two even and one odd. The following equations suffice when the half differences 20, 19, 18 are omitted.

$$\begin{array}{r|l} 21+15+11=17+16+14 & 21+8+1=15+13+2 \\ 13+8+7=12+10+6 & 14+11=9+7+6+3 \\ 9+2+1=5+4+3 & 17+10+5=16+12+4 \end{array}$$

TABLE OF EQUATIONS FOR PANDIAGONAL MAGICS OF ORDER 6 WITH MINIMAL NUMBERS.

HALF DIFF'S OMITTED	NUMBERS OMITTED	EQUATIONS FOR ROWS	EQUATIONS FOR COLUMNS
2	18, 20, 22	$19+18=17+10+9+1$ $16+15=13+11+4+3$ $14+12=8+7+6+5$	$19+16+12=18+15+14$ $17+8+3=11+10+7$ $13+5+1=9+6+4$
4	16, 20, 24	$19+13=14+9+6+3$ $18+17=15+11+7+2$ $16+10=12+8+5+1$	$19+18+1=17+13+8$ $16+7+3=14+10+2$ $15+9+5=12+11+6$
6	14, 20, 26	$19+12=11+9+7+4$ $18+17=15+14+5+1$ $16+10=13+8+3+2$	$19+17+10=18+16+12$ $15+11+8=14+13+7$ $9+2+1=5+4+3$
8	12, 20, 28	$19+16=15+10+6+4$ $18+17=14+13+5+3$ $12+9=11+7+2+1$	$19+18+7=17+16+11$ $15+3+2=13+6+1$ $12+10+5=14+9+4$
10	10, 20, 30	$19+12=14+9+5+3$ $18+16=15+11+7+1$ $17+8=13+6+4+2$	$19+18+8=17+16+12$ $15+14+4=13+11+9$ $7+3+2=6+5+1$
12	8, 20, 32	$19+16=15+10+6+4$ $18+17=14+13+5+3$ $11+8=9+7+2+1$	$19+17+7=18+16+9$ $15+3+2=13+6+1$ $14+8+4=11+10+5$
14	6, 20, 34	$19+17=15+10+8+3$ $18+13=16+7+6+2$ $12+9=11+5+4+1$	$19+13+12=18+17+9$ $15+7+1=16+4+3$ $10+6+5=11+8+2$
16	4, 20, 36	$18+10=12+8+7+1$ $17+13=19+6+3+2$ $15+14=11+9+5+4$	$19+10+1=15+9+6$ $18+8+2=14+11+3$ $17+7+5=13+12+4$
18	2, 20, 38	$19+17=16+10+7+3$ $15+14=13+8+6+2$ $12+9=11+5+4+1$	$19+15+9=17+14+12$ $16+6+5=13+11+3$ $10+4+2=8+7+1$

TABLE OF EQUATIONS FOR A PANDIAGONAL MAGIC OF ORDER 10 WITH MINIMAL NUMBERS, WHEN THE HALF DIFERENCE IS OMITTED.

$$\begin{array}{l}
51+48+43+42+41=49+47+46+44+39\\
45+36+34+33+32=40+38+37+35+30\\
31+26+25+24+22=29+28+27+23+21\\
20+17+15+13+12=19+18+16+14+10\\
11+\ 7+\ 5+\ 4+\ 1=\ 9+\ 8+\ 6+\ 3+\ 2
\end{array}$$

$$\begin{array}{l}
51+36+25+13+\ 1=48+34+24+15+\ 5\\
45+43+22+12+\ 4=41+32+26+20+\ 7\\
40+33+31+29=42+39+18+17+11+\ 6\\
49+30+28+19+\ 8=47+35+27+16+\ 9\\
46+38+23+10+\ 1=44+37+21+14+\ 3
\end{array}$$

By the foregoing methods the reader should have no difficulty in constructing a pandiagonal magic square of any double odd order n without using any number higher than n^2 if the following two concessions are granted, (I) zero allowed, (II) one duplicate permitted, that is, one number is allowed to appear twice. Fig. 11 is a pandiagonal magic made under the above conditions, 18 being the duplicate number and no number > 36. $\Sigma = 108$.

C. Planck.

BOOK REVIEWS AND NOTES.

CHARLES KIRKLAND WHEELER'S CRITIQUE OF PURE KANT.

This volume of easy, lively reading, whether one agree with the views therein expressed or not, is a bomb of New England manufacture thrown at Kant's conceptions and categories and doubly interesting from the fact that it comes from the pen of a man once devoted to medical science and the humanities.

Whatever exception may be taken from a certain turn of phraseology—and which we wish had not been adopted—the work suggests throughout a mind so vivid in its own realizations, so generously human, so assured of its own conceptions of truth that it can only converse to the reader and hold unswervingly its own unflickering lamp to the public view. There is a sterling honesty in the refuter which, whether we agree with the refutations or not, whether we are hostile or again prefer to take a more agnostic stand away from both philosophers, it must be granted places Dr. Wheeler in the rank of worthy combatants. He is so exquisitely sure that *he is* that a young student might well be conceived of as winning to a buoyant reassurance of his own individuality, his precious ego that he begrudged to yield up to the man who wants to float us promiscuously on an ill-defined, suspiciously unsure—in every direction—ocean of intermingled nonentity. A philosophy, even if expressed chiefly in refutation, is welcome when it leaves us neighbors, not intermingled fluid doubtfulness. This Dr. Wheeler's does. Minds, all in their own orbit of power, are. Things, be their origin what it may, are. Nor, with him, do we bump against obstinate rocks because we had fondly etherealized and renounced them in an absolute transcendentalism.

There is no carking egotism in the volume: rather, the spirit of a man in revolt against ought that savors of miserliness or the very least rejection of human rights. Essentially the writer proves his dwelling-place the humanities, however much he be occupied with Pure Reason.

"The very keystone to the whole arch of the Kantian metaphysics is that we *perceive and know nothing* of that of which it is the *blazing pronouncement of the primary consciousness that we do perceive and know something.*"

This is a pivoted phrase. Dr. Wheeler craves the deity in the ego. To be sure of a basis for Reason, to *know* some cause and effect in pure exemplification, to be able to believe and therefore win strength, this is the start and the goal.

What is God without knowledge and surety?

One must sense that Dr. Wheeler feared that the student caught in Kant's pure transcendentalism is likely to stray far from the humanities—so warmly embraced by the Gallic outlook—and that, at a day when in greatest degree the student can ill afford to be oblivious of them, the world is in danger of a complete slump from disregard of ethical connections which make for human progress.

We should realize the menace.

F. E. Duncan.

Cambridge, Mass.

THE PUBLICATION OF "ISIS."

[Reprinted from *Science,* N. S., Vol. XLIX, No. 1259, pp. 170-171, February 14, 1919.]

To the Editor of Science: The publication of *Isis,* an international quarterly devoted to the history and philosophy of science, was brutally interrupted in 1914 by the German invasion of Belgium. As I have no direct way of reaching all those who at that time had subscribed to Volumes II and III, I would be grateful to you if you would kindly insert this account of the future projects of the journal.

The sixth part of *Isis* was in the press in Brussels when war broke out. It will appear as soon as circumstances permit, but I fear this will not be until next autumn. The publication of Volume III, however, will take place soon after, perhaps in 1919, but at the latest in the early part of 1920. The undertaking in its original form met with encouraging support from many quarters; I may be permitted to mention for example that it is for my work in connection with it that the Prix Binoux was awarded to me by the Académie des Sciences of Paris in December, 1915. Yet after four years of work and thought the weaknesses of *Isis* are very obvious to me and I shall endeavor to correct them. Of course, the latter part of Volume II, as well as Volume III, which had already been prepared for publication in 1914, will not greatly differ from Volume I. But from Volume IV onward considerable changes will be made. It is my ambition to make *Isis* the main center of information in all matters pertaining to the history and philosophy of science, and the international organ of New Humanism.

Some of the features which I propose to introduce are as follows:

Instead of publishing in four languages, an effort will be made to use only French and English—chiefly, and perhaps exclusively, the latter. Articles written in other languages will be translated into English. More illustrations will be added and will consist mainly of portraits, facsimiles of manuscripts and of rare books. The bibliographical section will contain a larger number of short critical notes. Moreover, from Volume III or IV onward I hope to share the editorial responsibilities with other scientists, chiefly with Dr. Charles Singer of Exeter College, Oxford, who is known as a historian of medicine and a medieval scholar.

The new *Isis* will only publish shorter articles. The longer and more monographic ones would be included in Singer's ***Studies in the History and Method of Science.*** The first volume of this work was issued by the Oxford

University Press in 1917. I understand that the second volume is now ready for the press and Dr. Singer tells me that he hopes to share with me the editorial responsibilities of the third and succeeding volumes. Thus *Isis* and the *Studies* would be supplementary one to the other, and between them would provide a suitable outlet for new work on the history and philosophy of science.

George Sarton.

Carnegie Institution of Washington.

The Philosophy of Mr. B*rtr*nd R*ss*ll, with an Appendix of Leading Passages from Certain Other Works. Edited by *Philip E. B. Jourdain.* London: George Allen and Unwin Ltd.; Chicago: The Open Court Publishing Company, 1918. Pages, 96. With a picture wrapper. Price, 3s. 6d. net.

There is a great deal to be said for any philosophy that can stand a joke. Philosophies are usually too dignified for that; and for dignity Mr. B*rtr*nd R*ss*ll has little reverence (see Chap. XX, "On Dignity"). It is a method of hiding hollow ignorance under a pasteboard covering of pomposity. Laughter would shake down the house of cards.

Now what has given rise to much solemn humbug in philosophy is the vice of system-making. This vice the great contemporary of Mr. B*rtr*and R*ss*ll—Mr. Bertrand Russell—has avoided by a frank and frequent disavowal of any of his views as soon as later consideration has rendered them untenable without philosophic contortions. But such a characteristic is a little disconcerting to those of his admirers whose loyalty exceeds their powers of criticism. Thus one of them, referring to *The Problems of Philosophy* when it first appeared, wrote: "I feel in Mr. Russell's book the interest that a curate would feel in the publications of an archbishop who made important modifications in Christian doctrine every year."

Mr. Jourdain does not belong to this class; nor, on the other hand, must he be grouped with Mr. Russell's detractors, especially those of the type of that cocksure and stentorian gentleman who polishes off Mr. Russell as a little aside to the discussion of tables of mortality. It is true that some of Mr. Jourdain's arrows of wit penetrate very neatly the gaps in Mr. Russell's armor; but the main shower is directed to the confusion of his enemies. And I have no doubt that Mr. Jourdain would dissent from the dictum of the system-builders and the Red Queen that "when you've once said a thing, that fixes it," and would rather range himself beside Professor Santayana in agreeing that Mr. Russell's inconsistency does not go very deep, but is a sign of sincerity and pure love of truth (*Winds of Doctrine*, p. 112).

The plan of the book, however, lends itself admirably to the development of criticism. For Mr. B*rtr*nd R*ss*ll, whose papers are here collected, was killed by anti-suffragists in 1911; *his* philosophy therefore, though perhaps influencing Mr. Russell's, shows certain points of difference. One such arises, strange to say, from Mr. R*ss*ll's superior logical rigor. It is remarked, for example, by the editor that Mr. R*ss*ll would hardly have committed the error of obtaining a conclusion by means of one of those very vicious-circle fallacies he did so much to elucidate. Whereas Mr. Russell concluded a review of Bergson's *Laughter* with the reflection that "it would seem to be impossible to find any such formula as M. Bergson seeks. Every formula treats what is living as if it were mechanical, and is therefore by his own rule a fitting object of laughter" (p. 87).

But if Mr. Russell is beaten with whips, scorpions are the portion of the eminent Cambridge mathematician (p. 63), certain theologians (p. 58), the psychological logicians (p. 88), and the pragmatists (p. 32). Subtle fun is poked at Herbert Spencer (p. 70); and there is a deliciously satirical chapter on "The Mortality of Socrates," where Eternal Life is discussed in illustration of the fact that "one of the greatest merits of modern logic is that it has allowed us to give precision to such problems while definitely abandoning any pretensions of solving them." In fact this slender volume is full of clever illustrations of logical problems; it is impossible to read it without gaining immensely in understanding and enjoyment of such matters. The logical difficulties involved in the language of common discourse are wittily presented; the misuse of the definite article, for example, is at once clear if we realize with Mr. R*ss*ll that "people who refer to *the* Oxford Movement imply that Oxford only moved once" (p. 54). In addition Mr. Jourdain has provided us with an excellent "Guide to the Art of Polite Objurgation." Thus there are handy definitions of many words like "scholastic," which is an academic epithet applied by anti-metaphysical mathematicians to any mode of thought which is more exact than that to which they are accustomed (p. 23; cf. p. 74).

The most striking feature of the book is, however, in the breadth of view (uncommon in philosophers who are not also lady-novelists) shown in Mr. B*rtr*nd R*ss*ll's selection of "leading passages." For of course there are many philosophical works which do not appear in professional lists of recommended books. For instance the writings of Lewis Carroll are copiously quoted. Indeed it must be obvious to every reader of this volume that it is high time the "Open Court Series of Philosophical Classics" included Carroll, L.: *Collected Works, with full editorial notes* by Mr. Jourdain. And when this appears we must not forget that it was the late Mr. B*rtr*nd R*ss*ll who first pointed out the deep importance of the distinction between sign and signification made by the White Knight (p. 22); the nominalism of the Hatter (p. 23); and the likeness of the March Hare and the Gryphon (who changed the subject when Alice asked awkward questions) to those mathematicians whose method of solving the paradoxes, arising out of commonly held logical views, is simply not to notice them (p. 77). Furthermore Mr. R*ss*ll's demonstration that Humpty-Dumpty was a Hegelian is of great historical interest; the mode of proof being what has sometimes been called, slightingly, the *a priori* method of writing history—a method immortalized in the logical construction, by Mr. Russell, of what Leibniz's views would have been if they had formed a consistent whole.

No amount of quotation (finite by reason of editorial control) could exhaust the transfinite number of good things in this amusing volume. For the proof that this is not mere hyperbole I must refer the reader to the chapter on "The Hierarchy of Jokes." And when one comes delightedly across such gems of delicate irony as the logical analysis of Mr. Chesterton's method of disguising platitudes as paradoxes (p. 41) one can only hope that Mr. Jourdain will discover among the papers of the late Mr. R*ss*ll more, and still more, pin-prickings of popular bombastics.

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THE MONIST

THE LAW OF PARSIMONY.

"OCCAM'S RAZOR" is usually quoted in the form *Entia non sunt multiplicanda praeter necessitatem,* but it seems to be doubtful whether the "invincible doctor" actually used these words.[1] If he did not, however, he used others very similar, as for example, *Frustra fit per plura quod potest fieri per pauciora*; and since the "razor" is commonly used nowadays without special reference to the scholastic theory of entities or universals, the precise form in which Occam stated it is irrelevant.

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[1] See W. M. Thorburn, *Mind,* N. S., No. 94, pp. 287-288. Mr. Thorburn gives many references to the text of Occam (or Ockham), and also cites Hauréau (*Philosophie scholastique,* Chap. XXVIII), Erdmann (*History of Philosophy,* I, s. 216), De Wulf (*Mediæval Philosophy,* s. 368), and Prantl (*Geschichte der Logik,* pp. 327-340). The English reader will find a general account of Occam in *The Catholic Encyclopædia,* Vol. XV, p. 636, in Stöckl's *History of Mediæval Philosophy* (T. A. Finlay's translation, pp. 422-427), and in the late Dr. T. M. Lindsay's article on Occam in the *Encyclopædia Britannica* (11th ed., Vol. XIX). Mr. C. Delisle Burns wrote an article entitled "William of Ockham on Continuity" (*Mind,* N. S., No. 100), calling attention to certain parallels between Occam's views on continuity and those of Mr. Bertrand Russell.

A characteristic note of Sir William Hamilton's on the history of the Law of Parcimony (this spelling is sometimes preferred) may be mentioned in this connection. Hamilton says that the Law of Parcimony should be expressed as follows: "Neither *more* nor *more onerous* causes are to be assumed than are necessary to account for the phenomena." Then he continues:

"This phasis of the law has long been fully promulgated. Every condition of any consequence has, indeed, been articulately laid down by Aristotle; and subsequent philosophers, among whom Galen is conspicuous, have only repeated what was so clearly and so frequently inculcated by the Stagirite. Not only is it a maxim of his philosophy that God and Nature never operate without effect (οὐδὲν μάτην, οὐδὲν ἐλλειπῶς ποιοῦσι), they never operate superfluously (μηδὲν περίεργον—περιττῶς—ἄργως), but always through one rather than through a plurality of means (καθ' ἓν μᾶλλον ἢ κατὰ πολλά). The scholastic axioms: *Principia non sunt cumulanda; Frustra fit per plura quod fieri potest per pauciora; Natura horret superfluum,* these simply embody Aristotle's dicta; and the same, with a modification, is manifest of the *Novaculum Nominalium* or Occam's razor: *Entia non sunt multiplicanda praeter necessitatem.* Newton's first and principal rule of philosophizing, in so far as it is accurately expressed, simply repeats Aristotle's law: *Effectuum naturalium causae, non plures sunt admittendae quam quae, et verae sunt, et effectibus explicandis sufficiunt*" (*Discussions on Philosophy,* 3d edition, p. 624).

Among modern writers the principle is cited in very various connections. Sometimes it is regarded merely as a rule of method in the judicious choice of hypotheses. Scientific explanation cannot dispense with hypotheses, but it should be as sparing of them as it can. The principle of parsimony, in this sense, is therefore but a "safety razor" designed to protect against the dangers besetting the use of an indispensable instrument. On the other hand, the law of simplicity or economy in thinking is sometimes acclaimed as if it provided some sort of absolute guidance, and is even treated as the very essence of science, and therefore, one would suppose, of knowable reality. The design of this paper is to consider the principle both in its narrower aspect and in the more extended applications of it. As a preliminary to this inquiry, some general reflections concerning the principle and its difficulties seem to be required.

The maxim itself is naturally understood as a general appeal for economy couched in negative language denouncing extravagance. General appeals for economy have been common from the days of Isaiah the son of Amoz, but it is hard to see why a sumptuary edict of this sort should be more effective in matters of thinking than in matters political. Even when the need for economy is sincerely recognized it is never easy to determine where the path of true economy lies, for the simple reason that waste, luxury, and extravagance are relative terms. Why, then, should things be otherwise in this affair of thinking? Every one realizes that it is foolish to be recklessly prodigal of assumptions. That way incapacity lies. But in particular cases it is usually very difficult to prove that any given assumption is necessarily superfluous in every regard, very arbitrary to determine which regard is to be preferable to all others, and entirely impossible to legislate *a priori* on the question.

None the less there is a disposition in certain quarters to apply the principle of parsimony to scientific investigations in a fashion that is neither merely negative nor merely regulative. Dr. Whitehead, for example, while disclaiming any knowledge of what he calls the metaphysical validity of Occam's razor, claims that the maxim has its roots in something deeper than logical elegance, and that it is obviously valid in scientific inquiries since "every use of hypothetical entities diminishes the claims of scientific reasoning to be the necessary outcome of harmony between thought and sense-presentation. As hypothesis increases, necessity diminishes."[2]

Mr. Russell, again, although he states in one place that when science selects the simplest formula that will fit the facts "this, quite obviously, is merely a methodological precept, not a law of nature,"[3] expresses himself at other times in a way that conveys a different suggestion. "By the principle of Occam's razor," he says, "if the class of appearances will fulfil the purposes for the sake of which the thing was invented by the prehistoric metaphysicians to whom common sense is due, economy demands that we should identify the thing with the class of its appearances";[4] and he goes on to state in the next paragraph that "the supreme maxim in scientific philosophizing is this: *Whereever possible, logical constructions are to be substituted for inferred entities.*"

These statements, it is true, are not directly contradictory since the second of them professes to be concerned only with a supposed hypothesis of prehistoric metaphysicians, and since Mr. Russell adds that "it is not necessary sailant, but the jury do not require this hypothesis. They employ the principle of parsimony. In this case, however, their hypothesis deals with what they suppose to be a sufficient cause of the event, and it is with regard to causes (and more generally to correlations) that the law of parsimony is usually employed.

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[2] *The Organization of Thought*, pp. 175-176.

[3] *Mysticism and Logic*, p. 204.

[4] *Ibid.*, p. 155.

According to Mach and the Kirchhoff school the laws of nature are merely concise general descriptions of phenomena, and the aim of science is to discover the most compendious descriptions of this kind. These statements, however, are somewhat misleading since they seem to ignore the characteristic function of induction. Induction is not mere description, but essentially a process of inference. It is inference from the observed to the unobserved, and the ultimate logical problem of induction is just the question how far this inference from given data to unobserved cases is valid. The most striking instance of this logical problem is the question of the validity of prediction, but precisely the same problem occurs in retrospective inductive inference.

This definition, however, might be amended to meet such criticisms, and causal laws might be interpreted to mean the general descriptions of a class of relations holding between phenomena. Induction involves generalization and is the process whereby, when certain relations have been ascertained to hold between a given number of observed instances without contrary instances, the number of such observations is deemed sufficient to justify the inference that it is probable that these relations hold in every instance of the occurrence of phenomena of the kind at any time or place. The class so described is not an empirical collection of observed cases. On the contrary only a few of its members have been observed. But on the strength of the observation of a few instances the inference is drawn that certain of the characteristics found in these instances may be presumed to be true of every instance of the kind whether this instance is observed or unobserved, and, indeed, whether or not it is empirically possible to observe the instance. Such laws are also held to be true hypothetically when nothing of the sort occurred. No one doubts that Socrates would have died if he had stabbed himself to the heart before the time came for him to drink the hemlock, although, in point of fact, he preferred to await the due execution of the law.

Hypotheses concerning laws, therefore, imply a process whereby the analysis of a group of observed cases is extended by analogy to any member of the whole class of such cases. This procedure, it is plain, is connected with a principle of simplification. The analysis itself is selective since it endeavors to apprehend and retain the salient and relevant connections common to the observed cases, neglecting the others. Selective analysis is therefore in one of its aspects a process of simplification. Again there is simplification in the mere fact of dealing with a class in place of its several members. The definition of the class-concept supplies a rule for dealing with particular cases as need arises. It does not require the investigation of each particular instance. Indeed, when the number of members of the class is either indefinite so far as our information goes, or actually infinite, there is no chance of undertaking the detailed separate investigation. Moreover, the universal relationships common to the members of any class do not exhaust the individual characteristics of those members. There are limits set to generalization in the nature of things. The complexity of phenomena, in one sense, must simply be accepted. Nothing can make things less complex than they are; and the goal of scientific investigation is to select certain broad principles of relation, highly abstract and simple in themselves, which permit of precise deduction according to a rule. This is the kind of knowledge which brings power with it.

There seems, however, to be no royal road to the kind of simplicity which is required, and the circumstance that a universal is always abstract when compared with a particular does not warrant any conclusion concerning which universals are most fundamental in any given case, or what universals can be safely neglected. It is not at all obvious, for instance, why the insight of scientific thinkers should have seized, during so many centuries, upon the primary qualities to the neglect of the secondary. Even granting that the primary qualities are the meeting-place of many diverse sensations, it is, to say the least, curious that they should have been so persistently supposed to be the sole characteristics of objective reality. The kind of simplicity most useful for science must be known by its fruits, and not on account of any antecedent argument concerning simplicity, except in respect of the quite general requirement that in proportion as a hypothesis is capable of being elaborated deductively it is likely to be useful for explanatory purposes.

It should be noted, moreover, that the abstract simplicity of general relations is not the only element required in scientific explanations. Mach says, it is true, that "continuity, economy, and constancy mutually condition one another," and that "they are really only different aspects of one and the same property of all sound thinking."[8] This statement is an excellent example of illegitimate simplification. It alleges that three distinct factors are aspects of one of the factors. Surely it is clear that there may be a very simple set of logical relations between isolated and momentary phenomena. The demand for continuity and constancy in the world, particularly as the medium within which causal laws hold, is therefore quite distinct from the demand for simplicity.

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[8] *The Analysis of Sensations* (Eng. translation, ed. 1914), p. 328.

If the sole aim of science were the discovery by analysis of the logical relations between phenomena, a large number of suggestions in scientific works would have, at best, the value of mere illustrations. For instance, the desire to suggest or construct a model acting according to any given formula would have no scientific justification. When the equations have been discovered, where is the need for a model? In this view also, there would be little meaning in Hertz's conception of physics according to which the object of that science is the construction of an image representing the behavior of the phenomena in the sense that the logical deductions from the character of this image agree with the observed results. Model and image alike are as particular as the observed phenomena. Moreover, both of them contain irrelevant features since neither image nor model can be *mere* instances of the logical relations expressed in the formula. Such images or models, therefore, would be nothing but aids to the imagination.

In that case it is hard to understand why so much attention should have been devoted to them. Why should Faraday's suggestions of this kind, or Lord Kelvin's, be accounted works of genius, and why should a physicist of Schuster's eminence regard any theory which confines itself to logical analysis as an evasion of the task of science?[9] Why should Newton have argued as he did concerning *actio in distans*? Newton, as is well known, stated in his *Regulae Philosophandi* that he refrained altogether from making hypotheses concerning gravitation. He confined himself to the laws which could be deduced by analysis of the phenomena. But he also denied strenuously that *actio in distans* could be interpreted as a *vera causa*, saying that this was so great an absurdity that he believed "no man who has in philosophical matters a competent faculty of thinking can ever fall into it." "Gravity," he went on to say, "must be caused by an agent acting constantly according to certain laws."[10]

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[9] "This evasive school of philosophy," Schuster, *The Theory of Optics*, Preface.

If the bodies of scientific theory are regarded as *foci* within a field, this view of Newton's can scarcely seem evident. The necessity for it was due to the conception that physical bodies, like the "things" of common sense, are defined by their enclosure in a limited spatial area, the consequence being that *actio in distans* was a plain negation of any real continuity in causal action. It was necessary, therefore, that there should be a common agent for things correlated according to the formula of gravitation, and a connecting medium for the action of this agent. On these assumptions Newton's argument was just, and the distinction he drew between an agent acting uniformly and a uniform formula of correlation very noteworthy. He regarded the discovery, through analysis, of a correlation in the phenomena as a radically incomplete explanation however important the correlation might be. Moreover, he thought that a full account of the kind of substance acting according to the formula, and of the continuous presence and operation of this substance, was required.

It might be argued, it is true, that the observed phenomena themselves are the only substances in the case. These observed facts, however, are far too few and too scattered to permit this interpretation. Whatever happens in the world must be regarded as part of the continuous connected whole, and the mere fact of correlation between certain fragments of this whole, arbitrarily selected or subjectively revealed, is not enough for the purposes of explanation. Other entities than the observed facts, on the one hand, and the formulas of connection, on the other, must be supposed. These entities must often be hypothetical since they cannot be verified by ordinary methods, and it is not likely that there is only one set of hypothetical entities which can be conceived to meet this legitimate demand for continuity. The principle of parsimony, therefore, if it is really fundamental, should be fitted to decide why a preference should be given to one class of these entities rather than to another.

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[10] Letter to Bentley, Feb. 25, 1692-1693.

As we have seen, Mr. Russell maintains that it is. The most usual theory of the physical world, he shows, is derived from the common-sense notion of a "thing." Common sense speedily substitutes the notion of permanent things in space for the series of sense-data, fluctuating and varying with each individual percipient, which are actually observed. Thence arises the theory that the material universe consists of bodies possessing only primary qualities and occupying definitive positions in absolute space at definitive moments of absolute time. The actual data of sense are subsequently explained as resultants of the action of these physical objects upon a certain set of physical objects which we call sense-organs and the brain, peculiarly connected with the mind.

Mr. Russell holds that this hypothesis is an offense against the principle of parsimony. In the first place, physical objects as thus conceived are quite unverifiable. What we perceive necessarily consists of sense-data; and these, on account of the familiar arguments proving the relativity of sense-data to the percipient, cannot be identified with physical objects. In the second place, these hypothetical physical objects are supposed to cause our perceptions, but this supposition ignores one of the cardinal rules in the discovery of causes. If A can be inferred to be causally connected with B, both A and B must have been frequently observed together without any contrary instances having been discovered after a stringent search for them. According to the usual theory, however, this supposed cause is never observed and never can be observed. It is only the hypothetical correlate of certain observed facts. Thus, by all the rules, this inference is an exceedingly precarious one, and these hypothetical correlates should be abandoned if possible.

Mr. Russell, accordingly, brings forward an alternative theory according to which physical objects are certain series of perceived sense-data and of unperceived *sensibilia*. The weakest part of this important theory, however, seems to be its reliance on the principle of parsimony. Even in terms of this principle, support for the new hypothesis could be claimed in two cases only. Either the new hypothesis is simpler than the old in all respects, or it is simpler in the most important respects. The first of these claims, as will speedily appear, is quite untenable. The second is always open to the objection that the standard of importance must be arbitrary and subjective.

No theory of the nature of the physical world can avoid making some unverifiable assumptions, and Mr. Russell's theory is certainly not exempt from this inevitable fate. His theory, in its present form, requires him not only to accept the present and the remembered sense-data of some individual experient, but also to postulate the existence of the present and remembered sense-data of other experients. and an immense range of *sensibilia* which are not actually sensed at all and can only be described as possible sense-data. The first of these postulates may be accepted without challenge. The second, however, calls for comment.

The present and remembered sense-data of all human percipients do not form a world, but merely scraps of a world; and the reason why this or the other percipient should perceive this or that at any given time requires the assumption of continuous connection in this world. The mere existence of sense-data is not self-explanatory. Harris perceives a plate and a letter at breakfast time. He wants to know how the collection of sense-data which he calls a letter comes to be there, and he can scarcely do this without believing in a regular postal service. Again he is bound to reflect on the question how the same or a very similar collection of sense-data, called a plate, fulfils the same office for him every morning, and what he means by saying that the plate is on a shelf in his pantry when he and his household are asleep, and his cat is absent on a nocturnal ramble. To interpret these and similar experiences, Harris must be assured of the truth of a large, and, indeed, of an infinite number of hypothetical propositions. The plate, he knows, would look so and so in such and such a light; it would be part of an indistinguishable blur if he spun it on the table; it would look very different if he stood on his head and watched it; and if he were intoxicated or very sleepy it would assume all sorts of strange appearances.

The great advantage of the ordinary theory of perception is that it does not require us to assume the existence of any appearances except those which are actually presented to some percipient as the result of the stimulation of his sense-organs. These bizarre appearances, therefore, need not be supposed to exist except when Harris perceives them, and their peculiarities can then be explained by the state of Harris's nervous system. On the other hand, any theory which considers itself at liberty to assume the existence of unperceived *sensibilia,* the same in character as perceived sense-data, whenever there is a proved lack of continuity, suffers from the defect that it cannot logically set bounds to the number of these *sensibilia.* Like the magician in the fable it has made the well yield water, and cannot stop the flow. If it is legitimate (as, according to Mr. Russell's theory, it is necessary) to argue that the plate is not merely the circular disk which Harris perceives when he looks down on it, but that it is also, at the very same time, the whole multitude of ellipses which he would perceive from this or the other angle, it must also be legitimate to argue that it is, in addition, any appearance which he would perceive if he were dazed or drunk. Moreover, Harris's dog, and cat, and canary, and the wasp on his window pane have a right to be consulted. If the plate at any time is the whole collection of colored shapes which Harris or any other man would perceive from any possible point of view, it should also, by the same argument, include what any other animal would perceive. It may well be doubted, therefore, whether a theory requiring such an enormous number of unperceived sensibles is any simpler than the one it is designed to supplant. Of course, if a logical construction can always be devised to replace an inferred entity, then any inferred entity in physics can be replaced by a logical construction. A logical construction, however, neither exists nor is a cause. If the whole realm of existence were composed of the sense-data of those human beings and other animals which have existed up to the present, and if these sense-data were the only actual causes in the world, then there would be no room for the inferred entities of current physical theory. But no one's sense-data can be explained without assuming the existence of other entities than these sense-data. The choice is, therefore, between inferring entities of the type of atoms and molecules, and inferring the existence of an enormous number of unperceived sensibles which yet are supposed to exist and to operate in precisely the same fashion as the perceived sense-data. This hypothesis of concealed sensibles is possibly the better of the two. But it cannot be said to be required by the principle of parsimony.

We may conclude, therefore, that general appeals to the principle of parsimony cannot settle questions of this character, a fact which is an important comment upon the limitations of the principle of parsimony even when regarded as a rule for the choice of hypotheses. A larger issue remains, however. We can scarcely say, indeed, as Dr. Slop remarked to Corporal Trim on a celebrated occasion, "'Tis only a hypothesis, honest man. There's not a word of truth in it." A hypothesis claims to be probably true. But the general question of the relations between truth and intellectual economy raises still more fundamental problems than any considered hitherto.

On this larger issue there is a strongly marked antithesis in current philosophizing. On the one hand, it is common to find express statements to the effect that some particular theory is brought forward because it is simpler than its rivals, and not because it is therefore truer. It has the justification of a policy, not of a creed. On the other hand, truth itself is often defined as a species of intellectual convenience.

The stock example in connection with the former contention is the Copernican theory. Copernicus put forward the theory of his *De Revolutionibus* ostensibly as a mere hypothesis to simplify the task of saving the appearances. This device, however, was common in his time, and, indeed, was necessary for those who desired to live at peace with the Church. It is unlikely, therefore, that he regarded his conclusion as only an ingenious speculation. If he did, it is fair to conjecture that the grounds for his diffidence lay in the fact that the new hypothesis itself did not save the appearances without some cumbrousness and inexactitude. The principal reason for this, as modern readers can see, is that the retention by Copernicus of the postulate of uniform circular motion involved him in unnecessary difficulties and required him to presuppose some of the epicyclical machinery of Hipparchus and of Ptolemy's *Almagest*.

However that may be, Copernicus laid the foundation of the new theory securely in his proof of the relativity of observable motion. When this had been done, the common sense of mankind began to believe not merely in the simplicity but in the truth of the theory. This seems eminently reasonable, since the inductive problem itself may very well be defined as the endeavor to discover the principles which, with the fewest possible assumptions, suffice to save the appearances. Accordingly, if induction yields truth it seems necessary to assume at least that an explanation of this kind which is simpler than some other is also more probably true. To affirm that any suggested explanation *is* true *simpliciter* is, of course, another matter.

At the same time, there is a serious difficulty even in this qualified statement. It seems to be plain that among formally correct demonstrations of the same conclusion in mathematics or in formal logic, one may be simpler than another while both must be equally true, just because both are true. More generally, in the formal deduction of pure mathematics or symbolic logic there is a choice of sets of primitive propositions from which the system itself may be deduced. While there may be greater convenience and elegance in choosing one of these sets of primitive propositions in preference to the others, there can scarcely be any difference in respect of truth.

It is true that part of the difficulty thus arising may be surmounted readily enough. When Schopenhauer complained that many of Euclid's demonstrations were only conjuring tricks, he meant, presumably, that Euclid had recourse to special artifices and minor principles in his proofs although these artifices really depended upon more general ones. The difficulty, in fact, would be overcome if there were only one set of ultimate general principles upon which all others depended; but this solution is plainly inadequate if there are alternative sets of such fundamental propositions. The same conclusion follows with reference to any system of scientific concepts. Mach[11] remarks, very truly, that in all sciences a formal stage of development must succeed the deductive stage, since the principles assumed from time to time during the growth of the science must be revised and clarified and shown to be parts of a single harmonious elegant system. If, however, this formal development may take place on alternative lines, it does not seem possible to claim greater truth for the simpler system.

The contention that all intellectual thinking (and, ultimately, truth itself) is nothing but an economical contrivance, requires more elaborate consideration since there are so many different ways of interpreting it.

The most usual way of putting the case, is to affirm that thinking consists essentially in the use of symbols, and that symbols are merely abbreviated substitutes for facts. This is the substance of Mach's arguments.[12] Language, he says, is but an economic contrivance. Concepts are only compendious symbols for a fluid mass of fact. The concept of a "thing," for instance, is an abbreviated sign for a compound set of sensations of relative fixity. The concept of cause and effect is the selection of what purports to be a recurrent process in nature, although the fact that nature is present only once in any event shows that there can be no real recurrence. Similarly the laws of nature are short simple formulas standing for a multitude of facts. Finally, mathematics, the great instrument of the sciences, is itself the economy of counting; and counting is an economy.

These arguments are plausible until they are examined, but examination reveals a fatal weakness in their lax use of the term "symbol." Mach's reference to language, and the rest of his argument, suggest that he means by a grounds for inconvenience and worry where the others find none. In the long run, it is true, the sustained reflection on these inconvenient problems may lead to greater convenience in the way of clear thinking and control over nature than the complacent blindness of common sense. But this is not the psychological motive for the investigation. That motive is truth and not ease.

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[11] *The Science of Mechanics*, p. 421.

[12] See, e. g., *The Science of Mechanics*, pp. 481ff.

A similar conclusion follows when this harmony of experience is interpreted in the very different fashion which such writers as Mr. Bradley have made familiar. It is tacitly presupposed in these theories that the harmony of experience is of a logical type, even if, as in the metaphysics of Plotinus, Spinoza, or Mr. Bosanquet, the work of the logical intellect must be superseded, "in the end," by the more comprehensive and satisfying unity of intuition or mysticism. According to this metaphysic, it is true, our minds are only fragments of a cosmic whole, so that it is impossible to argue directly from the facts of human psychology to that cosmic ideal which is also the truth. On the other hand, the only clue to the nature of the Absolute is human experience "at its best"; and the phrase "at its best" in this connection must mean "at the most stringent level of logic." The harmony in question, therefore, is a very special sort of harmony.

None the less, a metaphysical basis for the law of economy would seem to be established if either of the above theories could be accepted. If truth consists in a particular kind of harmony of experience, and if concepts are particular ways of organizing experience with simplicity as part of their essence, then the law of economy is part of the being of truth. It would be necessary, indeed, for Mach or the pragmatists carefully to distinguish the sort of organization which we call logical thinking from other species of mental organization such as sentiment or association. The Absolutists, also, would require to define more narrowly what particular species of harmony it is which gives legitimate intellectual satisfaction. But the cosmic experience which, according to them, contains the whole truth, of which scientific generalizations are only faint adumbrations, must, one would suppose, be constituted according to certain organizing principles of supreme generality which are simple in outline and few in number. In our experience these are, *par excellence*, the organizing principles of our private worlds. They must also be presumed to be the organizing principles of that all-inclusive world in which science itself has its being.

There is an ultimate obstacle, however, in the way of accepting all such theories. The discovery of truth, it may be admitted, gives satisfaction and consequently indicates the presence of a certain psychological harmony. But this satisfaction is really due to the finality of the discovery. That is found which was sought, and the mind can rest in its discovery and gain confidence in its further powers of advancing. This harmony, then, is of quite a peculiar sort, and it presupposes the belief that a discovery has really been made. Truth is found and not manufactured.

The same argument holds of mental organization. The knowing mind must be regarded as an instrument capable of discovering a truth which in the last resort is simply given to it. This truth, however, is not given to it without infinite pains and labor, and the organization of the mind is the laborious process which the mind requires in order to attain the truth. The mind cannot ascertain the character of its objects without the organization of thought. It does not matter essentially whether these objects, in particular cases, are mental or not. The knowing mind has to discover the characteristics of sense-data in the same way as it has to discover anything else, and nothing that is known is a product of the knowing of it. The thinker, then, has to organize his mind in such a way as to make discovery possible, and, in particular, to dwell upon, hold fast to, and follow up those universal principles and relationships which enable him to comprehend a multitude of particulars. Such universals are not psychological constructs or psychological forces. They are as objective as any particulars What we ought to do is to organize our minds in order to keep the right principles in view, and to discover more and more of their nature.

If these contentions are sound, it is very difficult, indeed, to find a metaphysical basis for any form of the law of economy, and the natural inference is certainly that the law is only a precept indicating the path of wisdom. No doubt there is a certain connection between simplicity and any true propositions which imply generalization or imply that a universal rule holds of a multitude of instances. On the other hand, the significance and importance of simplicity for us seems to be much greater than its significance for the world. Things are what they are in all their wealth of detail. Why, then, should the truth of things be less subtle? Thus it seems plain common sense to urge that there can be no *a priori* law to the effect that either a thing or the truth about it is simple. Is the fact of the matter anything more than the truism that the principles which we are capable of apprehending must be simple, and that we, in our own interests, should try to keep to the simplest of them?

This position rests on strong ground. The complexity of the universe can never be simplified out of existence. It remains on our hands always. We may discover certain laws of connection running through it, but these are only a small selection from its total character. It pays us to attend to these laws since no others are of any use to us. But it would be the veriest anthropomorphism to make our advantage a criterion of the character of true being. It is conceivable, therefore, that the law of economy is neither more nor less than a rule of direction stating that we should always select the simplest of any general propositions which may be true and ascertainable, since it is these truths only that are likely to aid the mind in making further discoveries. This rule shows the path of wisdom in view of the limited powers and scope of the mind.

On the other hand, there is at least a possibility that this conclusion exaggerates the limitations of the human intellect, and that its very modesty leads to a sort of neurasthenic impotence instead of a structural one. The presupposition of the argument is that certain truths, both universal and particular, can be discovered, and it is scarcely doubtful that there is a fundamental order of precedence in the kingdom of knowable truths. The laws of logic, for example, take precedence of all others, and many humble generalizations must give the *pas* to the law of gravitation or to the conservation of energy. If, then, all truth is discovery, it is hard to suppose that this discovery should have preeminent importance in the nature of things, or that it should indicate nothing except the limitations of human minds. Would there not be a hierarchy of truths even for an omniscient knower, and would not the fundamental truths in this hierarchy be also simple? Is it conceivable, for instance, that the laws of logic would be less fundamental for such a being than they are for us?

It may be a biological accident that the logical intellect is capable of apprehending the truth of things in any measure. But this accident of evolution, if it is one, entails consequences; and if human beings can really understand at all, it is hard to suppose that the simplicity which is essential to the understanding has no genuine counterpart in reality. The fact that we *can* understand indicates the contrary, whatever the history of this power of comprehension may have been. On the other hand, this general conclusion can scarcely be used to decide particular cases, and even the tentative suggestion that there must be an essence of reality, and that this essence must be capable of being resolved into a limited number of supremely general propositions from which the minor ones can be deduced, seems to go distinctly further than the evidence requires. The laws of logic, indeed, must be judged to occupy a unique position in reality as well as in thought, but none of the specific facts of existence can be deduced from them alone.

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THE PHILOSOPHY OF LOGICAL ATOMISM.

VII. THE THEORY OF TYPES AND SYMBOLISM: CLASSES.

BEFORE I begin to-day the main subject of my lecture, I should like to make a few remarks in explanation and amplification of what I have said about existence in my previous two lectures. This is chiefly on account of a letter I have received from a member of the class, raising many points which, I think, were present in other minds too.

The first point I wish to clear up is this: I did not mean to say that when one says a thing exists, one means the same as when one says it is possible. What I meant was, that the fundamental logical idea, the primitive idea, out of which both those are derived is the same. That is not quite the same thing as to say that the statement that a thing exists is the same as the statement that it is possible, which I do not hold. I used the word "possible" in perhaps a somewhat strange sense, because I wanted some word for a fundamental logical idea for which no word exists in ordinary language, and therefore if one is to try to express in ordinary language the idea in question, one has to take some word and make it convey the sense that I was giving to the word "possible," which is by no means the only sense that it has but is a sense that was convenient for my purpose. We say of a propositional function that it is possible, where there are cases in which it is true.

have already the phrase "being in time" which quite sufficiently expresses what you mean.

Another objection to that definition is, that it does not in the least fit the sort of use of "existence" which was underlying my discussion, which is the common one in mathematics. When you take existence-theorems, for instance, as when you say "An even prime exists," you do not mean that the number two is in time but that you can find a number of which you can say "This is even and prime." One does ordinarily in mathematics speak of propositions of that sort as existence-theorems, i. e., you establish that there is an object of such-and-such a sort, that object being, of course, in mathematics a logical object, not a particular, not a thing like a lion or a unicorn, but an object like a function or a number, something which plainly does not have the property of being in time at all, and it is that sort of sense of existence-theorems that is relevant in discussing the meaning of existence as I was doing in the last two lectures. I do, of course, hold that that sense of existence can be carried on to cover the more ordinary uses of existence, and does in fact give the key to what is underlying those ordinary uses, as when one says that "Homer existed" or "Romulus did not exist," or whatever we may say of that kind.

I come now to a third suggestion about existence, which is also a not uncommon one, that of a given particular "this" you can say "This exists" in the sense that it is not a phantom or an image or a universal. Now I think that use of existence involves confusions which it is exceedingly important to get out of one's mind, really rather dangerous mistakes. In the first place, we must separate phantoms and images from universals; they are on a different level. Phantoms and images do undoubtedly exist in that sense, whatever it is, in which ordinary objects exist. I mean, if you shut your eyes and imagine some visual scene, the images that are before your mind while you are imagining are undoubtedly there. They are images, something is happening, and what is happening is that the images are before your mind, and these images are just as much part of the world as tables and chairs and anything else. They are perfectly decent objects, and you only call them unreal (if you call them so), or treat them as non-existent, because they do not have the usual sort of relations to other objects. If you shut your eyes and imagine a visual scene and you stretch out your hand to touch what is imaged, you won't get a tactile sensation, or even necessarily a tactile image. You will not get the usual correlation of sight and touch. If you imagine a heavy oak table, you can remove it without any muscular effort, which is not the case with oak tables that you actually see. The general correlations of your images are quite different from the correlations of what one chooses to call "real" objects. But that is not to say images are unreal. It is only to say they are not part of physics. Of course, I know that this belief in the physical world has established a sort of reign of terror. You have got to treat with disrespect whatever does not fit into the physical world. But that is really very unfair to the things that do not fit in. They are just as much there as the things that do. The physical world is a sort of governing aristocracy, which has somehow managed to cause everything else to be treated with disrespect. That sort of attitude is unworthy of a philosopher. We should treat with exactly equal respect the things that do not fit in with the physical world, and images are among them.

"Phantoms," I suppose, are intended to differ from "images" by being of the nature of hallucinations, things that are not merely imagined but that go with belief. They again are perfectly real; the only odd thing about them is their correlations. Macbeth sees a dagger. If he tried to touch it, he would not get any tactile sensation, but that does not imply that he was not *seeing* a dagger, it only implies that he was not *touching* it. It does not in any way imply that the visual sensation was not there. It only means to say that the sort of correlation between sight and touch that we are used to is the normal rule but not a universal one. In order to pretend that it is universal, we say that a thing is unreal when it does not fit in. You say "Any man who is a man will do such-and-such a thing." You then find a man who will not, and you say, he is not a man. That is just the same sort of thing as with these daggers that you cannot touch.

I have explained elsewhere the sense in which phantoms are unreal.[1] When you see a "real" man, the immediate object that you see is one of a whole system of particulars, all of which belong together and make up collectively the various "appearances" of the man to himself and others. On the other hand, when you see a phantom of a man, that is an isolated particular, not fitting into a system as does a particular which one calls an appearance of the "real" man. The phantom is in itself just as much part of the world as the normal sense-datum, but it lacks the usual correlation and therefore gives rise to false inferences and becomes deceptive.

As to universals, when I say of a particular that it exists, I certainly do not mean the same thing as if I were to say that it is not a universal. The statement concerning any particular that it is not a universal is quite strictly nonsense—not false, but strictly and exactly nonsense. You never can place a particular in the sort of place where a universal ought to be, and *vice versa*. If I say "*a* is not *b*," or if I say "*a* is *b*," that implies that *a* and *b* are of the same logical type. When I say of a universal that it exists, I should be meaning it in a different sense from that in which one says that particulars exist. E. g., you might say "Colors exist in the spectrum between blue and yellow." That would be a perfectly respectable statement, the colors being taken as universals. You mean simply that the propositional function "x is a color between blue and yellow" is one which is capable of truth. But the x which occurs there is not a particular, it is a universal. So that you arrive at the fact that the ultimate important notion involved in existence is the notion that I developed in the lecture before last, the notion of a propositional function being sometimes true, or being, in other words, possible. The distinction between what some people would call real existence, and existence in people's imagination or in my subjective activity, that distinction, as we have just seen, is entirely one of correlation. I mean that anything which appears to you, you will be mistakenly inclined to say has some more glorified form of existence if it is associated with those other things I was talking of in the way that the appearance of Socrates to you would be associated with his appearance to other people. You would say he was only in your imagination if there were not those other correlated appearances that you would naturally expect. But that does not mean that the appearance to you is not exactly as much a part of the world as if there were other correlated appearances. It will be exactly as much a part of the real world, only it will fail to have the correlations that you expect. That applies to the question of sensation and imagination. Things imagined do not have the same sort of correlations as things sensated. If you care to see more about this question, I wrote a discussion in *The Monist* for January, 1915, and if any of you are interested, you will find the discussion there.

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[1] See *Our Knowledge of the External World*, Chap. III. Also Section XII of "Sense-Data and Physics" in *Mysticism and Logic*.

I come now to the proper subject of my lecture, but shall have to deal with it rather hastily. It was to explain the theory of types and the definition of classes. Now first of all, as I suppose most of you are aware, if you proceed carelessly with formal logic, you can very easily get into contradictions. Many of them have been known for a long time, some even since the time of the Greeks, but it is only fairly recently that it has been discovered that they bear upon mathematics, and that the ordinary mathematician is liable to fall into them when he approaches the realms of logic, unless he is very cautious. Unfortunately the mathematical ones are more difficult to expound, and the ones easy to expound strike one as mere puzzles or tricks.

You can start with the question whether or not there is a greatest cardinal number. Every class of things that you can choose to mention has some cardinal number. That follows very easily from the definition of cardinal numbers as classes of similar classes, and you would be inclined to suppose that the class of all the things there are in the world would have about as many members as a class could be reasonably expected to have. The plain man would suppose you could not get a larger class than the class of all the things there are in the world. On the other hand, it is very easy to prove that if you take selections of some of the members of a class, making those selections in every conceivable way that you can, the number of different selections that you can make is greater than the original number of terms. That is easy to see with small numbers. Suppose you have a class with just three numbers, *a, b, c*. The first selection that you can make is the selection of no terms. The next of *a* alone, *b* alone, *c* alone. Then *bc, ca, ab, abc,* which makes in all 8 (i.e., 2^3) selections. Generally speaking, if you have n terms, you can make 2^n selections. It is very easy to prove that 2^n is always greater than n, whether n happens to be finite or not. So you find that the total number of things in the world is not so great as the number of classes that can be made up out of those things. I am asking you to take all these propositions for granted, because there is not time to go into the proofs, but they are all in Cantor's work. Therefore you will find that the total number of things in the world is by no means the greatest number. On the contrary, there is a hierarchy of numbers greater than that. That, on the face of it, seems to land you in a contradiction. You have, in fact, a perfectly precise arithmetical proof that there are *fewer* things in heaven or earth than are dreamt of in *our* philosophy. That shows how philosophy advances.

You are met with the necessity, therefore, of distinguishing between classes and particulars. You are met with the necessity of saying that a class consisting of two particulars is not itself in turn a fresh particular, and that has to be expanded in all sorts of ways; i. e., you will have to say that in the sense in which there are particulars, in that sense it is not true to say there are classes. The sense in which there are classes is a different one from the sense in which there are particulars, because if the senses of the two were exactly the same, a world in which there are three particulars and therefore eight classes, would be a world in which there are at least eleven things. As the Chinese philosopher pointed out long ago, a dun cow and a bay horse makes three things: separately they are each one, and taken together they are another, and therefore three.

I pass now to the contradiction about classes that are not members of themselves. You would say generally that you would not expect a class to be a member of itself. For instance, if you take the class of all the teaspoons in the world, that is not in itself a teaspoon. Or if you take all the human beings in the world, the whole class of them is not in turn a human being. Normally you would say you cannot expect a whole class of things to be itself a member of that class. But there are apparent exceptions. If you take, e. g., all the things in the world that are not teaspoons and make up a class of them, that class obviously (you would say) will not be a teaspoon. And so generally with negative classes. And not only with negative classes, either, for if you think for a moment that classes are things in the same sense in which things are things, you will then have to say that the class consisting of all the things in the world is itself a thing in the world, and that therefore this class is a member of itself. Certainly you would have thought that it was clear that the class consisting of all the classes in the world is itself a class. That I think most people would feel inclined to suppose, and therefore you would get there a case of a class which is a member of itself. If there is any sense in asking whether a class is a member of itself or not, then certainly in all the cases of the ordinary classes of everyday life you find that a class is not a member of itself. Accordingly, that being so, you could go on to make up the class of all those classes that are not members of themselves, and you can ask yourself, when you have done that, is that class a member of itself or is it not?

Let us first suppose that it is a member of itself. In that case it is one of those classes that are not members of themselves, i. e., it is not a member of itself. Let us then suppose that it is not a member of itself. In that case it is not one of those classes that are not members of themselves, i. e., it is one of those classes that are members of themselves, i. e., it is a member of itself. Hence either hypothesis, that it is or that it is not a member of itself, leads to its contradiction. If it is a member of itself, it is not, and if it is not, it is.

That contradiction is extremely interesting. You can modify its form; some forms of modification are valid and some are not. I once had a form suggested to me which was not valid, namely the question whether the barber shaves himself or not. You can define the barber as "one who shaves all those, and those only, who do not shave themselves." The question is, does the barber shave himself? In this form the contradiction is not very difficult to solve. But in our previous form I think it is clear that you can only get around it by observing that the whole question whether a class is or is not a member of itself is nonsense, i. e., that no class either is or is not a member of itself, and that it is not even true to say that, because the whole form of words is just a noise without meaning. That has to do with the fact that classes, as I shall be coming on to show, are incomplete symbols in the same sense in which the descriptions are that I was talking of last time; you are talking nonsense when you ask yourself whether a class is or is not a member of itself, because in any full statement of what is meant by a proposition which seems to be about a class, you will find that the class is not mentioned at all and that there is nothing about a class in that statement. It is absolutely necessary, if a statement about a class is to be significant and not pure nonsense, that it should be capable of being translated into a form in which it does not mention the class at all. This sort of statement, "Such-and-such a class is or is not a member of itself," will not be capable of that kind of translation. It is analogous to what I was saying about descriptions: the symbol for a class is an incomplete symbol; it does not really stand for part of the propositions in which symbolically it occurs, but in the right analysis of those propositions that symbol has been broken up and disappeared.

There is one other of these contradictions that I may as well mention, the most ancient, the saying of Epimenides that "All Cretans are liars." Epimenides was a man who slept for sixty years without stopping, and I believe that it was at the end of that nap that he made the remark that you will find that the contradiction has disappeared, because he will have to say what type of liar he is. If he says "I am asserting a false proposition of the first type," as a matter of fact that statement, since it refers to the totality of propositions of the first type, is of the second type. Hence it is not true that he is asserting a false proposition of the first type, and he remains a liar. Similarly, if he said he was asserting a false proposition of the 30,000th type, that would be a statement of the 30,001th type, so he would still be a liar. And the counter-argument to prove that he was also not a liar has collapsed.

You can lay it down that a totality of any sort cannot be a member of itself. That applies to what we are saying about classes. For instance, the totality of classes in the world cannot be a class in the same sense in which they are. So we shall have to distinguish a hierarchy of classes. We will start with the classes that are composed entirely of particulars: that will be the first type of classes. Then we will go on to classes whose numbers are classes of the first type: that will be the second type. Then we will go on to classes whose members are classes of the second type: that will be the third type, and so on. Never is it possible for a class of one type either to be or not to be identical with a class of another type. That applies to the question I was discussing a moment ago, as to how many things there are in the world. Supposing there are three particulars in the world. There are then, as I was explaining, 8 classes of particulars. There will be 2^8 (i. e., 256) classes of classes or particulars, and 2^{256} classes of classes of classes of particulars, and so on. You do not get any contradiction arising out of that, and when you ask yourself the question: "Is there, or is there not a greatest cardinal number?" the answer depends entirely upon whether you are confining yourself within some one type, or whether you are not. Within any given type there is a greatest cardinal number, namely, the number of objects of that type, but you will always be able to get a larger number by going up to the next type. Therefore, there is no number so great but what you can get a greater number in a sufficiently high type. There you have the two sides of the argument: the one side when the type is given, the other side when the type is not given.

I have been talking, for brevity's sake, as if there really were all these different sorts of things. Of course, that is nonsense. There are particulars, but when one comes on to classes, and classes of classes, and classes of classes of classes, one is talking of logical fictions. When I say there are no such things, that again is not correct. It is not significant to say "There are such things" in the same sense of the words "there are" in which you can say "There are particulars." If I say "There are particulars" and "There are classes," the two phrases "there are" will have to have different meanings in those two propositions, and if they have suitable different meanings, both propositions may be true. If, on the other hand, the words "there are" are used in the same sense in both, then one at least of those statements must be nonsense, not false but nonsense. The question then arises, what is the sense in which one can say "There are classes," or in other words, what do you mean by a statement in which a class appears to come in? First of all, what are the sort of things you would like to say about classes? They are just the same as the sort of things you want to say about propositional functions. You want to say of a propositional function that it is sometimes true. That is the same thing as saying of a class that it has members. You want to say that it is true for exactly 100 values of the variables. That is the same as saying of a class that it has a hundred members. All the things you want to say about classes are the same as the things you want to say about propositional functions excepting for accidental and irrelevant linguistic forms, with, however, a certain proviso which must now be explained.

Take, e. g., two propositional functions such as "x is a man," "x is a featherless biped." Those two are formally equivalent, i. e., when one is true so is the other, and *vice versa.* Some of the things that you can say about a propositional function will not necessarily remain true if you substitute another formally equivalent propositional function in its place. For instance, the propositional function "x is a man" is one which has to do with the concept of humanity. That will not be true of "x is a featherless biped." Or if you say, "So-and-so asserts that such-and-such is a man" the propositional function "x is a man" comes in there, but "x is a featherless biped" does not. There are a certain number of things which you can say about a propositional function which would be not true if you substitute another formally equivalent propositional function. On the other hand, any statement about a propositional function which will remain true or remain false, as the case may be, when you substitute for it another formally equivalent propositional function, may be regarded as being about the class which is associated with the propositional function. I want you to take the words *may be regarded* strictly. I am using them instead of *is,* because *is* would be untrue. "Extensional" statements about functions are those that remain true when you substitute any other formally equivalent function, and these are the ones that may be regarded as being about the class. If you have any statement about a function which is not extensional, you can always derive from it a somewhat similar statement which is extensional, viz., there is a function formally equivalent to the one in question about which the statement in question is true. This statement, which is manufactured out of the one you started with, will be extensional. It will always be equally true or equally false of any two formally equivalent functions, and this derived extensional statement may be regarded as being the corresponding statement about the associated class. So, when I say that "The class of men has so-and-so many members," that is to say "There are so-and-so many men in the world," that will be derived from the statement that "x is human" is satisfied by so-and-so many values of x, and in order to get it into the extensional form, one will put it in this way, that "There is a function formally equivalent to 'x is human,' which is true for so-and-so many values of x." That I should define as what I mean by saying "The class of men has so-and-so many members." In that way you find that all the formal properties that you desire of classes, all their formal uses in mathematics, can be obtained without supposing for a moment that there are such things as classes, without supposing, that is to say, that a proposition in which symbolically a class occurs, does in fact contain a constituent corresponding to that symbol, and when rightly analyzed that symbol will disappear, in the same sort of way as descriptions disappear when the propositions are rightly analyzed in which they occur.

There are certain difficulties in the more usual view of classes, in addition to those we have already mentioned, that are solved by our theory. One of these concerns the null-class, i. e., the class consisting of no members, which is difficult to deal with on a purely extensional basis. Another is concerned with unit-classes. With the ordinary view of classes you would say that a class that has only one member was the same as that one member. That will land you in terrible difficulties, because in that case that one member is a member of that class, namely, itself. Take, e. g., the class of "Lecture audiences in Gordon Square."[2] That is obviously a class of classes, and probably it is a class that has only one member, and that one member itself (so far) has more than one member. Therefore if you were to identify the class of lecture audiences in Gordon Square with the only lecture audience that there is in Gordon Square, you would have to say both that it has one member and that it has twenty members, and you will be landed in contradictions, because this audience has more than one member, but the class of audiences in Gordon Square has only one member. Generally speaking, if you have any collection of many objects forming a class, you can make a class of which that class is the only member, and the class of which that class is the only member will have only one member, though this only member will have many members. This is one reason why you must distinguish a unit-class from its only member. Another is that, if you do not, you will find that the class is a member of itself, which is objectionable, as we saw earlier in this lecture. I have omitted a subtlety connected with the fact that two formally equivalent functions may be of different types. For the way of treating this point, see *Principia Mathematica*, p. 20, and Introduction, Chap. III.

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[2] [These lectures were given in Gordon Square, London.—Ed.]

I have not said quite all that I ought to have said on this subject. I meant to have gone a little more into the theory of types. The theory of types is really a theory of symbols, not of things. In a proper logical language it would be perfectly obvious. The trouble that there is arises from our inveterate habit of trying to name what cannot be named. If we had a proper logical language, we should not be tempted to do that. Strictly speaking, only particulars can be named. In that sense in which there are particulars, you cannot say either truly or falsely that there is anything else. The word "there is" is a word having "systematic ambiguity," i. e., having a strictly infinite number of different meanings which it is important to distinguish.

DISCUSSION.

........Could you lump all those classes, and classes of classes, and so on, together?

Mr. Russell: All are fictions, but they are different fictions in each case. When you say "There are classes of particulars," the statement "there are" wants expanding and explaining away, and when you have put down what you really do mean, or ought to mean, you will find that it is something quite different from what you thought. That process of expanding and writing down fully what you mean, will be different if you go on to "There are classes of classes of particulars." There are infinite numbers of meaning to "there are." The first only is fundamental, so far as the hierarchy of classes is concerned.

........I was wondering whether it was rather analogous to spaces, where the first three dimensions are actual, and the higher ones are merely symbolic. I see there is a difference, there are higher dimensions, but you can lump those together.

Mr. Russell: There is only one fundamental one, which is the first one, the one about particulars, but when you have gone to classes, you have traveled already just as much away from what there is as if you have gone to classes of classes. There are no classes really in the physical world. The particulars are there, but not classes. If you say "There is a universe" that meaning of "there is" will be quite different from the meaning in which you say "There is a particular," which means that "the propositional function 'x is a particular' is sometimes true."

All those statements are about symbols. They are never about the things themselves, and they have to do with "types." This is really important and I ought not to have forgotten to say it, that the relation of the symbol to what it means is different in different types. I am not now talking about this hierarchy of classes and so on, but the relation of a predicate to what it means is different to the relation of a name to what it means. There is not one single concept of "meaning" as one ordinarily thinks there is, so that you can say in a uniform sense "All symbols have meaning," but there

there to be named, although in another sense it is true that you cannot know the world unless you know the facts that make up the truths of the world; but the knowing of facts is a different sort of thing from the knowing of simples.

Another purpose which runs through all that I have been saying is the purpose embodied in the maxim called Occam's Razor. That maxim comes in, in practice, in this way: take some science, say physics. You have there a given body of doctrine, a set of propositions expressed in symbols—I am including words among symbols—and you think that you have reason to believe that on the whole those propositions, rightly interpreted, are fairly true, but you do not know what is the actual meaning of the symbols that you are using. The meaning they have *in use* would have to be explained in some pragmatic way: they have a certain kind of practical or emotional significance to you which is a datum, but the logical significance is not a datum, but a thing to be sought, and you go through, if you are analyzing a science like physics, these propositions with a view to finding out what is the smallest empirical apparatus—or the smallest apparatus, not necessarily wholly empirical—out of which you can build up these propositions. What is the smallest number of simple undefined things at the start, and the smallest number of undemonstrated premises, out of which you can define the things that need to be defined and prove the things that need to be proved? That problem, in any case that you like to take, is by no means a simple one, but on the contrary an extremely difficult one. It is one which requires a very great amount of logical technique; and the sort of thing that I have been talking about in these lectures is the preliminaries and first steps in that logical technique. You cannot possibly get at the solution of such a problem as I am talking about if you go at it in a straightforward fashion with just the ordinary acumen that one accumulates in the course of reading or in the study of traditional philosophy. You do need this apparatus of symbolical logic that I have been talking about. (The description of the subject as symbolical logic is an inadequate one. I should like to describe it simply as logic, on the ground that nothing else really is logic, but that would sound so arrogant that I hesitate to do so.)

Let us consider further the example of physics for a moment. You find, if you read the works of physicists, that they reduce matter down to certain elements—atoms, ions, corpuscles, or what not. But in any case the sort of thing that you are aiming at in the physical analysis of matter is to get down to very little bits of matter that still are just like matter in the fact that they persist through time, and that they travel about in space. They have in fact all the ordinary every-day properties of physical matter, not the matter that one has in ordinary life—they do not taste or smell or appear to the naked eye—but they have the properties that you very soon get to when you travel toward physics from ordinary life. Things of that sort, I say, are not the ultimate constituents of matter in any metaphysical sense. Those things are all of them, as I think a very little reflection shows, logical fictions in the sense that I was speaking of. At least, when I say they are, I speak somewhat too dogmatically. It is possible that there may be all these things that the physicist talks about in actual reality, but it is impossible that we should ever have any reason whatsoever for supposing that there are. That is the situation that you arrive at generally in such analyses. You find that a certain thing which has been set up as a metaphysical entity can either be assumed dogmatically to be real, and then you will have no possible argument either for its reality or against its reality; or, instead of doing that, you can construct a logical fiction having the same formal properties, or rather having formally analogous formal properties to those of the supposed metaphysical entity and itself composed of empirically given things, and that logical fiction can be substituted for your supposed metaphysical entity and will fulfil all the scientific purposes that anybody can desire. With atoms and the rest it is so, with all the metaphysical entities whether of science or of metaphysics. By metaphysical entities I mean those things which are supposed to be part of the ultimate constituents of the world, but not to be the kind of thing that is ever empirically given,—I do not say merely not being itself empirically given, but not being the *kind* of thing that is empirically given. In the case of matter, you can start from what is empirically given, what one sees and hears and smells and so forth, all the ordinary data of sense, or you can start with some definite ordinary object, say this desk, and you can ask yourselves, "What do I mean by saying that this desk that I am looking at now is the same as the one I was looking at a week ago?" The first simple ordinary answer would be that it *is* the same desk, it is actually identical, there is a perfect identity of substance, or whatever you like to call it. But when that apparently simple answer is suggested, it is important to observe that you cannot have an empirical reason for such a view as that, and if you hold it, you hold it simply because you like it and for no other reason whatever. All that you really know is such facts as that what you see now, when you look at the desk, bears a very close similarity to what you saw a week ago when you looked at it. Rather more than that one fact of similarity I admit you know, or you may know. You might have paid some one to watch the desk continuously throughout the week, and might then have discovered that it was presenting appearances of the same sort all through that period, assuming that the light was kept on all through the night. In that way you could have established continuity. You have not in fact done so. You do not in fact know that that desk has gone on looking the same all the time, but we will assume that. Now the essential point is this: What is the empirical reason that makes you call a number of appearances, appearances of the same desk? What makes you say on successive occasions, I am seeing the same desk? The first thing to notice is this, that it does not matter what is the answer, so long as you have realized that the answer consists in something empirical and not in a recognized metaphysical identity of substance. There is something given in experience which makes you call it the same desk, and having once grasped that fact, you can go on and say, it is that something (whatever it is) that makes you call it the same desk which shall be *defined* as *constituting* it the same desk, and there shall be no assumption of a metaphysical substance which is identical throughout. It is a little easier to the untrained mind to conceive of an identity than it is to conceive of a system of correlated particulars, hung one to another by relations of similarity and continuous change and so on. That idea is apparently more complicated, but that is what is empirically given in the real world, and substance, in the sense of something which is continuously identical in the same desk, is not given to you. Therefore in all cases where you seem to have a continuous entity persisting through changes, what you have to do is to ask yourself what makes you consider the successive appearances as belonging to one thing. When you have found out what makes you take the view that they belong to the same thing, you will then see that that which has made you say so, is all that is *certainly* there in the way of unity. Anything that there may be over and above that, I shall recognize as something I cannot know. What I can know is that there are a certain series of appearances linked together, and the series of those appearances I shall define as being a desk. In that way the desk is reduced to being a logical fiction, because a series is a logical fiction. In that way all the ordinary objects of daily life are extruded from the world of what there is, and in their place as what there is you find a number of passing particulars of the kind that one is immediately conscious of in sense. I want to make clear that I am not *denying* the existence of anything; I am only refusing to affirm it. I refuse to affirm the existence of anything for which there is no evidence, but I equally refuse to deny the existence of anything against which there is no evidence. Therefore I neither affirm nor deny it, but merely say, that is not in the realm of the knowable and is certainly not a part of physics; and physics, if it is to be interpreted, must be interpreted in terms of the sort of thing that can be empirical. If your atom is going to serve purposes in physics, as it undoubtedly does, your atom has got to turn out to be a construction, and your atom will in fact turn out to be a series of classes of particulars. The same process which one applies to physics, one will also apply elsewhere. The application to physics I explained briefly in my book on the *External World,* Chapters III and IV (Open Court Publishing Co., 1914).

I have talked so far about the unreality of the things we think real. I want to speak with equal emphasis about the reality of things we think unreal, such as phantoms and hallucinations. Phantoms and hallucinations, considered in themselves, are, as I explained in the preceding lectures, on exactly the same level as ordinary sense-data. They differ from ordinary sense-data only in the fact that they do not have the usual correlations with other things. In themselves they have the same reality as ordinary sense-data. They have the most complete and absolute and perfect reality that anything can have. They are part of the ultimate constituents of the world, just as the fleeting sense-data are. Speaking of the fleeting sense-data, I think it is very important to remove out of one's instincts any disposition to believe that the real is the permanent. There has been a metaphysical prejudice always that if a thing is really real, it has to last either forever or for a fairly decent length of time. That is to my mind an entire mistake. The things that are really real last a very short time. Again I am not denying that there *may* be things that last forever, or for thousands of years; I only say that those are not within our experience, and that the real things that we know by experience last for a very short time, one tenth or half a second, or whatever it may be. Phantoms and hallucinations are among those, among the ultimate constituents of the world. The things that we call real, like tables and chairs, are systems, series of classes of particulars, and the particulars are the real things, the particulars being sense-data when they happen to be given to you. A table or chair will be a series of classes of particulars, and therefore a logical fiction. Those particulars will be on the same level of reality as a hallucination or a phantom. I ought to explain in what sense a chair is a series of classes. A chair presents at each moment a number of different appearances. All the appearances that it is presenting at a given moment make up a certain class. All those sets of appearances vary from time to time. If I take a chair and smash it, it will present a whole set of different appearances from what it did before, and without going as far as that, it will always be changing as the light changes, and so on. So you get a series in time of different sets of appearances, and that is what I mean by saying that a chair is a series of classes. That explanation is too crude, but I leave out the niceties, as that is not the actual topic I am dealing with. Now each single particular which is part of this whole system is linked up with the others in the system. Supposing, e. g., I take as my particular the appearance which that chair is presenting to me at this moment. That is linked up first of all with the appearance which the same chair is presenting to any one of you at the same moment, and with the appearance which it is going to present to me at later moments. There you get at once two journeys that you can take away from that particular, and that particular will be correlated in certain definite ways with the other particulars which also belong to that chair. That is what you mean by saying—or what you ought to mean by saying—that what I see before me is a real thing as opposed to a phantom. It means that it has a whole set of correlations of different kinds. It means that that particular, which is the appearance of the chair to me at this moment, is not isolated but is connected in a certain well-known familiar fashion with others, in the sort of way that makes it answer one's expectations. And so, when you go and buy a chair, you buy not only the appearance which it presents to you at that moment, but also those other appearances that it is going to present when it gets home. If it were a phantom chair, it would not present any appearances when it got home, and would not be the sort of thing you would want to buy. The sort one calls real is one of a whole correlated system, whereas the sort you call hallucinations are not. The respectable particulars in the world are all of them linked up with other particulars in respectable, conventional ways. Then sometimes you get a wild particular, like a merely visual chair that you cannot sit on, and say it is a phantom, a hallucination, you exhaust all the vocabulary of abuse upon it. That is what one means by calling it unreal, because "unreal" applied in that way is a term of abuse and never would be applied to a thing that *was* unreal because you would not be so angry with it.

I will pass on to some other illustrations. Take a person. What is it that makes you say, when you meet your friend Jones, "Why, this is Jones"? It is clearly not the persistence of a metaphysical entity inside Jones somewhere, because even if there be such an entity, it certainly is not what you see when you see Jones coming along the street; it certainly is something that you are not acquainted with, not an empirical datum. Therefore plainly there is something in the empirical appearances which he presents to you, something in their relations one to another, which enables you to collect all these together and say, "These are what I call the appearances of one person," and that something that makes you collect them together is not the persistence of a metaphysical subject, because that, whether there be such a persistent subject or not, is certainly not a datum, and that which makes you say "Why, it is Jones" is a datum. Therefore Jones is not constituted as he is known by a sort of pin-point ego that is underlying his appearances, and you have got to find some correlations among the appearances which are of the sort that make you put all those appearances together and say, they are the appearances of one person. Those are different when it is other people and when it is yourself. When it is yourself, you have more to go by. You have not only what you look like, you have also your thoughts and memories and all your organic sensations, so that you have a much richer material and are therefore much less likely to be mistaken as to your own identity than as to some one else's. It happens, of course, that there are mistakes even as to one's own identity, in cases of multiple personality and so forth, but as a rule you will know that it is you because you have more to go by than other people have, and you would know it is you, not by a consciousness of the ego at all but by all sorts of things, by memory, by the way you feel and the way you look and a host of things. But all those are empirical data, and those enable you to say that the person to whom something happened yesterday was yourself. So you can collect a whole set of experiences into one string as all belonging to you, and similarly other people's experiences can be collected together as all belonging to them by relations that actually are observable and without assuming the existence of the persistent ego. It does not matter in the least to what we are concerned with, what exactly is the given empirical relation between two experiences that makes us say, "These are two experiences of the same person." It does not matter precisely what that relation is, because the logical formula for the construction of the person is the same whatever that relation may be, and because the mere fact that you can know that two experiences belong to the same person proves that there is such an empirical relation to be ascertained by analysis. Let us call the relation R. We shall say that when two experiences have to each other the relation R, then they are said to be experiences of the same person. That is a definition of what I mean by "experiences of the same person." We proceed here just in the same way as when we are defining numbers. We first define what is meant by saying that two classes "have the same number," and then define what a number is. The person who has a given experience x will be the class of all those experiences which are "experiences of the same person" as the one who experiences x. You can say that two events are co-personal when there is between them a certain relation R, namely that relation which makes us say that they are experiences of the same person. You can define the person who has a certain experience as being those experiences that are co-personal with that experience, and it will be better perhaps to take them as a series than as a class, because you want to know which is the beginning of a man's life and which is the end. Therefore we shall say that a person is a certain series of experiences. We shall not deny that there may be a metaphysical ego. We shall merely say that it is a question that does not concern us in any way, because it is a matter about which we know nothing and can know nothing, and therefore it obviously cannot be a thing that comes into science in any way. What we know is this string of experiences that makes up a person, and that is put together by means of certain empirically given relations, such, e. g., as memory.

I will take another illustration, a kind of problem that our method is useful in helping to deal with. You all know the American theory of neutral monism, which derives really from William James and is also suggested in the work of Mach, but in a rather less developed form. The theory of neutral monism maintains that the distinction between the mental and the physical is entirely an affair of arrangement, that the actual material arranged is exactly the same in the case of the mental as it is in the case of the physical, but they differ merely in the fact that when you take a thing as belonging in the same context with certain other things, it will belong to psychology, while when you take it in a certain other context with other things, it will belong to physics, and the difference is as to what you consider to be its context, just the same sort of difference as there is between arranging the people in London alphabetically or geographically. So, according to William James, the actual material of the world can be arranged in two different ways, one of which gives you physics and the other psychology. It is just like rows or columns: in an arrangement of rows and columns, you can take an item as either a member of a certain row or a member of a certain column; the item is the same in the two cases, but its context is different.

If you will allow me a little undue simplicity I can go on to say rather more about neutral monism, but you must understand that I am talking more simply than I ought to do because there is not time to put in all the shadings and qualifications. I was talking a moment ago about the appearances that a chair presents. If we take any one of these chairs, we can all look at it, and it presents a different appearance to each of us. Taken all together, taking all the different appearances that that chair is presenting to all of us at this moment, you get something that belongs to physics. So that, if one takes sense-data and arranges together all those sense-data that appear to different people at a given moment and are such as we should ordinarily say are appearances of the same physical object, then that class of sense-data will give you something that belongs to physics, namely, the chair at this moment. On the other hand, if instead of taking all the appearances that that chair presents to all of us at this moment, I take all the appearances that the different chairs in this room present to me at this moment, I get quite another group of particulars. All the different appearances that different chairs present to me now will give you something belonging to psychology, because that will give you my experiences at the present moment. Broadly speaking, according to what one may take as an expansion of William James, that should be the definition of the difference between physics and psychology.

We commonly assume that there is a phenomenon which we call seeing the chair, but what I call my seeing the chair according to neutral monism is merely the existence of a certain particular, namely the particular which is the sense-datum of that chair at that moment. And I and the chair are both logical fictions, both being in fact a series of classes of particulars, of which one will be that particular which we call my seeing the chair. That actual appearance that the chair is presenting to me now is a member of me and a member of the chair, I and the chair being logical fictions. That will be at any rate a view that you can consider if you are engaged in vindicating neutral monism.

There is no simple entity that you can point to and say: this entity is physical and not mental. According to William James and neutral monists that will not be the case with any simple entity that you may take. Any such entity will be a member of physical series and a member of mental series. Now I want to say that if you wish to test such a theory as that of neutral monism, if you wish to discover whether it is true or false, you cannot hope to get any distance with your problem unless you have at your fingers' end the theory of logic that I have been talking of. You never can tell otherwise what can be done with a given material, whether you can concoct out of a given material the sort of logical fictions that will have the properties you want in psychology and in physics. That sort of thing is by no means easy to decide. You can only decide it if you really have a very considerable technical facility in these matters. Having said that, I ought to proceed to tell you that I have discovered whether neutral monism is true or not, because otherwise you may not believe that logic is any use in the matter. But I do not profess to know whether it is true or not. I feel more and more inclined to think that it may be true. I feel more and more that the difficulties that occur in regard to it are all of the sort that may be solved by ingenuity. But nevertheless there *are* a number of difficulties; there are a number of problems, some of which I have spoken about in the course of these lectures. One is the question of belief and the other sorts of facts involving two verbs. If there are such facts as this, that, I think, may make neutral monism rather difficult, but as I was pointing out, there is the theory that one calls behaviorism, which belongs logically with neutral monism, and that theory would altogether dispense with those facts containing two verbs, and would therefore dispose of that argument against neutral monism. There is, on the other hand, the argument from emphatic particulars, such as "this" and "now" and "here" and such words as that, which are not very easy to reconcile, to my mind, with the view which does not distinguish between a particular and experiencing that particular. But the argument about emphatic particulars is so delicate and so subtle that I cannot feel quite sure whether it is a valid one or not, and I think the longer one pursues philosophy, the more conscious one becomes how extremely often one has been taken in by fallacies, and the less willing one is to be quite sure that an argument is valid if there is anything about it that is at all subtle or elusive, at all difficult to grasp. That makes me a little cautious and doubtful about all these arguments, and therefore although I am quite sure that the question of the truth or falsehood of neutral monism is not to be solved except by these means, yet I do not profess to know whether neutral monism is true or is not. I am not without hopes of finding out in the course of time, but I do not profess to know yet.

As I said earlier in this lecture, one thing that our technique does, is to give us a means of constructing a given body of symbolic propositions with the minimum of apparatus, and every diminution in apparatus diminishes the risk of error. Suppose, e. g., that you have constructed your physics with a certain number of entities and a certain number of premises; suppose you discover that by a little ingenuity you can dispense with half of those entities and half of those premises, you clearly have diminished the risk of error, because if you had before 10 entities and 10 premises, then the 5 you have now would be all right, but it is not true conversely that if the 5 you have now are all right, the 10 must have been. Therefore you diminish the risk of error with every diminution of entities and premises. When I spoke about the desk and said I was not going to assume the existence of a persistent substance underlying its appearances, it is an example of the case in point. You have anyhow the successive appearances, and if you can get on without assuming the metaphysical and constant desk, you have a smaller risk of error than you had before. You would not necessarily have a smaller risk of error if you were tied down to *denying* the metaphysical desk. That is the advantage of Occam's Razor, that it diminishes your risk of error. Considered in that way you may say that the whole of our problem belongs rather to science than to philosophy. I think perhaps that is true, but I believe the only difference between science and philosophy is, that science is what you more or less know and philosophy is what you do not know. Philosophy is that part of science which at present people choose to have opinions about, but which they have no knowledge about. Therefore every advance in knowledge robs philosophy of some problems which formerly it had, and if there is any truth, if there is any value in the kind of procedure of mathematical logic, it will follow that a number of problems which had belonged to philosophy will have ceased to belong to philosophy and will belong to science. And of course the moment they become soluble, they become to a large class of philosophical minds uninteresting, because to many of the people who like philosophy, the charm of it consists in the speculative freedom, in the fact that you can play with hypotheses. You can think out this or that which *may* be true, which is a very valuable exercise until you discover what *is* true; but when you discover what is true the whole fruitful play of fancy in that region is curtailed, and you will abandon that region and pass on. Just as there are families in America who from the time of the Pilgrim Fathers onward had always migrated westward, toward the backwoods, because they did not like civilized life, so the philosopher has an adventurous disposition and likes to dwell in the region where there are still uncertainties. It is true that the transferring of a region from philosophy into science will make it distasteful to a very important and useful type of mind. I think that is true of a good deal of the applications of mathematical logic in the directions that I have been indicating. It makes it dry, precise, methodical, and in that way robs it of a certain quality that it had when you could play with it more freely. I do not feel that it is my place to apologize for that, because if it is true, it is true. If it is not true, of course, I do owe you an apology; but if it is, it is not my fault, and therefore I do not feel I owe any apology for any sort of dryness or dulness in the world. I would say this too, that for those who have any taste for mathematics, for those who like symbolic constructions, that sort of world is a very delightful one, and if you do not find it otherwise attractive, all that is necessary to do is to acquire a taste for mathematics, and then you will have a very agreeable world, and with that conclusion I will bring this course of lectures to an end.

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NOTES ON MAHAYANA BUDDHISM.

III. MAHAYANA BUDDHISM AS PSYCHOLOGY.

The Existence of the Soul.—We now come to a discussion of what many consider the most difficult part of Buddhism, and which is, beyond doubt, the point most misunderstood by all Occidental students of that faith, whether Hinayana or Mahayana—the question as to the nature of the soul. It is often said that Buddhism denies the existence of the soul, but this is a gross misrepresentation. It does, indeed, reject the idea of the soul being an absolute thing, a thing in itself, but to Buddhism the existence of the soul, though only as a compound, is a thing indisputable and not requiring proof.

In order to understand fully the teachings of the Buddha concerning the nature and fate of the soul, it is first of all necessary to know something of the psychological opinions which were current in India at the time of his life. According to these, the "soul" consisted of a collection of "bodies"—the material, the emotional, mental, spiritual, etc.—which are constantly changing, but which are united by a permanent and unchanging *atman* or ego-entity.[16] Now Hinayana affirms, as also does Mahayana in its negative phase, the same idea of the soul, except that it denies such a thing as an atman which binds the various "bodies" together. In other words, it teaches that the soul consists of five *skandahs* (mental qualities) which have been gathered together as a result of the actions of a former group of skandahs, and that the only link between them is the sequence of cause and effect.

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[16] It is to be noted that there is a sharp difference between Christianity and Hinduism in regard to the soul, though both accept its absolute existence. In a general way, however, it may be said that the "soul" of Paul corresponds to the various bodies taken together and the "spirit" to the atman.

The Atman in Mahayana.—Mahayana in its positive phase, however, in contradistinction to Hinayana, differs a little from this. The atman, according to Brahmanism, is a spark of the divine, and Mahayana, in the sense that each individual is a manifestation of the divine, teaches that there is an atman. It holds, however, that there is only one atman, the Bhutatathata of which we are all aspects, and that the divine spirit within A is not different from the divine spirit within B. In other words, the distinction between Mahayana and the popular Hindu theory of the atman, is that the latter teaches that there was originally one great ocean of life (Parabrahm) from which a portion has been taken and put into each individual so that the divine drop within each person is distinct and separate from that of every other person, and all the drops, in turn, are separate and distinct from the great ocean; while Mahayana, on the other hand, holds that there is only the great ocean (Bhutatathata) and that although there are many waves (personalities) the real essence of each wave (the water) remains at one with the other waves.[17]

In short, the Mahayanist asserts that the great divine ocean, if it be truly divine, must be omnipresent and all-pervading, and that consequently we must all exist in it. Now if we live in the divine ocean, and the drop within each one of us is of exactly the same nature as the ocean itself (as Hinduism teaches) it follows necessarily that the drop must be one with the universal ocean and indistinguishable from it, just as a drop is one with and indistinguishable in the material ocean.[18] Certainly, however false or true either one of the two theories may be, that of Mahayana is the more logical.

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[17] As a matter of fact, several of the Vedantin schools of India hold to the Mahayana idea on this point, thus making Mahayana and Vedantism almost identical, except of course for verbal and minor differences, and they may be regarded as different sects of the same religion rather than as separate and distinct faiths.

The Persistence of the Personality.—But, it may be objected, however fine this may be theoretically, what of its practical application? What of the survival of the personality? Does Buddhism deny or affirm that the individuality, the I and the you, continue to exist after death? Buddhism in answer to this question, affirms, characteristically, that it both does and does not, or, in other words, that it persists in one sense and does not persist in another sense. This, of course, at first sight seems foolish and illogical, but Buddhism will point out the human body in defense—in one sense it persists from year to year while in another sense it does not, for we all know that the particles of which the body is composed are constantly changing, and physiology even tells us that in seven years it is an entirely new body, having not a single material thing in it which it had seven years previously, and yet do we not speak at the same time of the same body persisting from babyhood until death? In the same way the Buddhist will speak of the persistence and non-persistence of the soul. The point which we have noted—namely that according to Buddhism the soul is a compound thing and not a thing in itself—must not be forgotten. Excepting the four limbs, the trunk and the head, where is the body? In like manner according to Buddhism, excepting the five skandahs, where is the individual soul? And as we know the body, i. e., matter which composes the limbs, trunk, and head, is constantly changing, therefore says the Buddhist, why not the soul?

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[18] Except that the material ocean is composed of atoms and that, since space must exist between atoms, the water does not really cover all the space it seemingly occupies. The divine ocean, however, must be non-atomical since it is absolutely omnipresent, and consequently no space however minute can divide one portion from another.

The Nature of the Individuality.—This question as to the persistence and the non-persistence of the personality may be likened to the wheel of a cart, a simile which has often been used by Buddhist writers since it gives an excellent idea of *non-atman*—for except for the hub, spokes, and rim, what is there? Now supposing that one of the spokes on the wheel were to wear out and were replaced, and then another, and so on, and finally the hub and the rim; there would be nothing left of the original wheel, and yet we would be justified in speaking about it, in one sense, as the same wheel. We would be justified in saying that the personality (that is the actual materials) of the wheel is constantly changing and is perishable, yet we may also say that the individuality (that is the wheel taken as a whole) persists, though by individuality we do not mean a certain concrete thing, such as the hub, or one of the spokes, or the rim. This remains changeless in the midst of change. In like manner the Buddhist declares that while the individuality is ever changing, the individuality continues, though by individuality is meant not an imperishable ego-entity, but merely the sequence of cause and effect.

The Law of Karma.—Buddhism is essentially scientific inasmuch as it lays especial stress upon the law of cause and effect, or in Buddhist phraseology, *karma*, that which Saint Paul spoke of when he said, "As ye sow, so shall ye reap." All philosophies have in a general way accepted it, but Buddhism has given it especial emphasis. This fact, considering that Buddhism was formulated centuries before the time of Christ, long before the discovery of the laws of the conservation of matter, and of energy, is little less than remarkable.

Karma to Buddhism, however, has a little different significance than to any other religious or philosophical system, on account of its denial of the ego-entity. Karma, or the idea of retribution, in other systems means that what a personality sows it reaps, while in Buddhism it signifies the method of the formation of a new personality as well. Here again, when the idea thus seems difficult to understand, physiology comes to the rescue. Take the body for example: in one sense it may be said that the body reaps what it sows—thus when it has been strongly under the influence of liquor it has a headache—yet to speak more exactly, an intoxicated body causes the formation of an ill body, for if the body is not the same for two consecutive moments, it follows that in one sense the body which was intoxicated is a different one from that body which suffers the consequences.

In like manner, the karma of our present personality will, according to Buddhism, result in the formation of a new personality, though, as we have already seen, the two personalities are in one sense identical. Thus, for example, we are told that the deeds and thoughts of a vicious man will, upon his death, result in the formation of a new personality in one of the hells, just as those of the virtuous man in one of the heavens.

Reincarnation.—Buddhism of both branches, however, in addition to the idea of a rebirth in a heaven or hell, teaches that a reincarnation may also occur on earth. In other words, the karma or the fruits of our actions, whether good or bad, will result in the formation of a new personality in this world again. In this way, Buddhism accounts for the many seeming injustices which are everywhere apparent and which, in the West, have been the cause of so much questioning as to the wisdom and mercy of God, since, of course, Buddhism teaches that the state of the new personality will be conditioned by the acts of its predecessor.

I have used the words "new personality" and "predecessor," but, as has already been noted, it is in one way the same person who both sows and reaps. Certainly it is far nearer the truth to say that they are absolutely identical than that they are absolutely different, just as it is far nearer the truth to say that the man who committed a murder and the man who is justly hanged for it is the same than that they are two different individuals.

Buddhism, however, since it rejects the idea of a mysterious ego-entity which departs from one body and goes into another, prefers to speak not of transmigration, which gives too atmanistic a conception, but of reincarnation or rebirth. What is it that is reborn? As we have already seen, it is the karma of the dead man, the fruit of his deeds, and in that sense the man himself; but it is also more than that, since Buddhism teaches that a man's desires or wishes are reincarnated. What are we but a bundle of sensations and desires? Yet Buddhism assures us that these wishes live on in the new personality long after the old personality has decayed.

The Nature of the Rebirth.—While the Buddha affirmed the truth of the idea of reincarnation in no uncertain terms, many of the questions as to the exact method by which it occurred were left unanswered by him. In popular Hinduism, the atman was supposed to leave the old body at death at the top of the head and enter into the body newly prepared for it, by the same means. In Buddhism with its denial of the atman, this was of course impossible, but the Buddha as far as we have any authentic record, does not seem to have taken the trouble to formulate any substitute hypothesis as to the nature of the link between the two personalities; nor has Mahayana, in spite of its development along other lines, ever apparently felt the need of dealing more in detail with the matter.

Then too, Buddhism, while closely linking the ideas of retribution and reincarnation, has never been very explicit as to just what does determine the future state of man, whether it is his deeds or his thoughts alone, or both. In the different moral stories which the Buddha is supposed to have related concerning his own and others' past lives, the cause of the state of existence varies widely. Sometimes it would appear to be the net balance of the whole of a man's actions, sometimes a single exceptional thought or deed, or again it would be merely the result of a strong desire held when the person was dying. The reincarnation is not, according to popular Buddhism, limited to the human kingdom, it being possible for a man to be reborn as an animal, and *vice versa,* while, on the other hand, a man may rise and in his next existence become a god.

There is also some ambiguity as to whether the "soul" enters at once into a new physical body or remains in a disembodied form for some time. Some of the *Jataka* or rebirth tales would seem to imply the former, but modern Mahayana for the most part holds that the person remains some time in one of the heavens or hells before being reincarnated. This metempsychosis continues until Nirvana or Buddhahood is attained, when one at length secures freedom from the chain of birth and death.

IV. MAHAYANA BUDDHISM AS ETHICS.

Anatman and Morality.—It is often objected that the Buddhist conception of the soul is conducive to immortality. If people think, it is alleged, that if even in one sense it is another person who will reap the benefits of their good deeds, they will cease from striving, or that another person will be punished for their vices, they will give themselves over to licentiousness. The Buddhist will answer, however, that this conception is justified neither by logic nor by its results in the countries where the doctrine of *anatman* has been applied. Look at the people of China and Japan, and the other Buddhist nations, he will say, and whatever may be their individual moral failings, one must note that they go on striving in order that their next birth may be a fortunate one. We find them in their old age rejoicing at the fact that they will soon be provided with a new body: we find them praying that they may be reborn in the Pure Land (*jodo*) that they may more quickly enter Nirvana. And this not because of the fact that among the lower classes the idea of anatman is not fully understood or believed, as has been sometimes objected, for I have found by personal observation that the peasants as well as the educated classes are acquainted in a general way with the doctrine and fully believe in it. And, certainly, even supposing that the objection were true, do we not find among the monks who assuredly comprehend and uphold it, a rigid morality, a stern austerity? It would be nearer the truth, the Buddhist will affirm, to say that in actual life the idea leads to asceticism rather than to self-indulgence.

Moreover, he will go further than this, for he will cite the behavior of people all the world over. The body that swallows the poison is not the same body (in one sense) that dies—but does that mean that a knowledge of and belief in this fact causes men to drink strychnine? We know that the man who eats injudiciously and the man who suffers the consequences are in one sense different, yet knowing this fact are we any less careful of our digestions? The person who carefully saves his money and the person who at the end of a lifetime has the fortune are as much different as Buddhism teaches that he will be in his next life, yet would it be fair, argues the Buddhist, to lay all extravagance to this fact? Why, therefore, he will argue, should we say that the doctrine of anatman leads to immorality?

The Threefold Path.—What, then, *is* the moral law of Buddhism? What is it that the Buddha instructed his disciples to do in order to acquire merit? Speaking on this subject, the Rt. Rev. Shaku Soyen, Head Abbot of the Zen sect and one of the leading lights of Buddhism, says, "It (the moral law) is threefold, (1) to cease from doing evil; (2) to promote goodness; and (3) to enlighten the ignorant. In this conception, Buddhist ethics is the simplest thing in the world. In the latter part of the Tang dynasty in China there was a famous poet-statesman who is known in Japanese as Hak-rak-ten. He learned that there resided in his district a Buddhist monk greatly noted for his saintly life and scholarly learning, and he went to see him intending to discourse with him on some deep religious subjects. Ushered in to his presence, the poet inquired what the monk thought to be the most influential thing in Buddhism. The monk replied without hesitation that it was the teaching of all unenlightened beings, to cease from doing evil, to promote goodness, and to purify one's heart. Hak-rak-ten was nonplussed to receive such a commonplace from such a renowned personage professing the faith of Buddhism, for he had expected something highly speculative and metaphysical. . . . The poet therefore sharply retorted, "This is what every child of three summers is acquainted with. I, on the other hand, desire to know what is most abstruse, most essential and vital in Buddhism." The monk, however, coldly replied, "Every child of three summers may know what I said now, but even a silver-haired old man of eighty winters finds it difficult to put the Buddhist instructions into the practice of every-day life." And it is said that thereupon the poet-statesman reverentially bowed and went home full of thought.

The Eightfold Path.—As a matter of fact, however, Buddhist morality is by no means as simple as that, since we have elaborations of this threefold path in many shapes and guises. The most noted of these, because of the fact that it is supposed to have been preached by the Buddha himself, is the so-called Noble Eightfold Path, which we have already seen to be one of the points common to Mahayana and Hinayana alike.

This is, as has been seen, (1) right belief or comprehension, (2) right aspiration, (3) right speech, (4) right deeds, (5) right mode of livelihood, (6) right effort or endeavor, (7) right mindfulness or self-discipline, and lastly (8) right rapture or ecstasy. This division of the moral code is simple (almost childish, one might say) yet covers practically all the ground. One or two things about it, however, require especial notice. To begin with, what in Christian terminology would be called *faith* is regarded as only one of eight necessary qualifications, amounting to much less than in Christian theology; yet, considering the influence it has upon one's character, the Buddha was certainly justified in putting it first and foremost in his list of the necessary virtues. The Buddha also evidently recognized the truth which was expressed by the Hebrew prophet who proclaimed that where there is no vision the people perish, when he placed "right aspiration" or the possession of high ideals as one of the most important of the moral qualifications. The only other point which requires any explanation is the seventh one, namely, that of self-discipline. It must not be supposed from this that Buddhism teaches asceticism or self-mortification, since we know that the Buddha made it one of his especial aims to denounce the absurd lengths to which the Hindus of his day had gone in this respect. In fact we find him proclaiming in his first sermon, "There are two extremes which he who has gone forth[19] ought not to follow—habitual devotion to the passions on the one hand, to the pleasures of sensual things, etc., and habitual devotion on the other hand to self-mortification, which is painful, ignoble, and unprofitable." And we find throughout his life, his use of the word "the Middle Path" (between the two extremes) to denote his teachings.

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[19] This term signifies one who seeks after enlightenment, and is the word which is commonly used to express this idea.

The Fetters of the Path.—In addition to the positive moral code which has been outlined, Buddhism has also a negative one, i. e., one which declares what things are evil and to be avoided. First and foremost there are the four intoxicants which hold back the seeker after enlightenment, namely, (1) mental infatuation arising from sensual pleasures, (2) that which arises from pride of life, (3) from ignorance, and lastly (4) from useless speculation over what is unsolvable.

Then there are the ten chief bonds, or lions in the Path: (1) belief in the atman, (2) doubt, (3) dependence upon works, (4) sensuality, (5) hatred, (6) desire for rebirth on earth, (7) or in heaven, (8) conceit, (9) self-righteousness, and last but not least (10) ignorance. These bonds may be classified into five groups consisting of: (1) the first three, which are supposed to be swept away upon "conversion" to Buddhism (if I may be permitted such a word); (2) next the fourth and the fifth, the so-called coarser bonds; (3) then the sixth and the seventh, the finer bonds, of desire; (4) then pride and self-righteousness against which the Christ so vigorously protested; and lastly (5) ignorance, the final fetter, which when cast aside gives perfect enlightenment to the seeker.

The Practical Side of Buddhist Morality.—Such may be said to be the theoretical side of Buddhist morality, the mental states to be cultivated and avoided, etc., but in addition to this, Buddhist morality has also its practical aspect. Speaking generally it may be said that this aspect has five chief features, namely, (1) non-sensuality, (2) sobriety, (3) harmlessness, (4) truthfulness, and (5) honesty. Of the first, of the necessity of leading a chaste life, we have already spoken, lust being one of the ten bonds above mentioned. The Buddha seems to have laid especial emphasis on this point, and we find the Sutra of the Forty-Two Sections, one of the principal Mahayana Sutras, declaring as the words of the Buddha, that it were well that there is no other fetter as powerful as lust, since if there were, to follow the Noble Path would then be impossible. Concerning the second point, it is of interest to note that the Buddha was evidently several centuries ahead of his time as far as the drink problem is concerned, since we find him forbidding the partaking of all forms of alcoholic liquors. The third feature shows itself in an unwillingness to kill any creature, whether human or animal. In consequence of this we have two further main precepts of Buddhism, non-resistance and vegetarianism. The fourth and fifth precepts are, of course, common to all ethics as well as to all religions, and so require no further explanation or elucidation.

Non-Observance of the Moral Law.—As is the case with Christian morality in Christian countries, many points of the high and stern moral law of the Buddha are often relaxed in individual observance. One of the principal reasons for this may be found in the external organization of Buddhism, which, whatever its merits may be, has certainly its demerits in this respect. According to strict Budhism only the monks are true Buddhists, the laymen, however pious, are mere half-hearted ones. The priests are not, as in Christian countries, the leaders and teachers of the people, but persons who draw aside from the world that they may live a more perfect life and win enlightenment and salvation,[20] while the laymen are looked upon as those who outside of the church support the monks in "acquiring merit." Such an order of things would necessarily lead to laxity among the laymen, and accordingly not only do we find them marrying, as is of course to be expected, but also drinking wine and eating meat. However, enough of the Buddhist spirit prevails to cause butchers and brewers to be regarded as among the basest members of society, and an unwillingness is manifest to kill any animal directly even though it will be eaten without compunction after it has been slaughtered by some one else.

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[20] Here again the Shin Shu differs from ordinary Buddhism, inasmuch as its priests go out into the world far more than do the priests of the other sects, and their duties approach very nearly those of the Christian clergyman.

Another and stronger reason for the weakening of these basic rules, however, is that Mahayana (not Hinayana) Buddhism has absorbed something of the spirit of the end justifying the means. Thus while the Buddha preached of the value of peace at all costs, we find Mahayana teaching that while war is undoubtedly bad, it certainly would be worse to see the good suffer, and so, unlike Hinayana which still proclaims the doctrine of absolute non-resistance,[21] we find the Mahayana priests not only not decrying war but actually encouraging it as long as they consider it a righteous one. In like manner they even encourage the eating of meat by soldiers since it has been found that flesh makes them healthier, on the grounds that while it is bad to eat meat, it is worse that the right side should suffer on account of weakness arising from the lack of it. Thus, too, in the case of marriage, while Hinayana only allows it on sufferance since it knows that it is impossible to prevent it altogether, Mahayana, on the other hand, encourages it in the case of the layman in order to propagate a healthy race. In fact we even find some of the Buddhist casuists maintaining that the telling of a falsehood is justified in some cases, though, wisely enough, less emphasis has been laid upon this point than might be, owing to the fact that it would be popularly misunderstood and taken advantage of.

The Morality of the Salvation-by-Faith School.—It is necessary, before closing this chapter on Buddhist morality, to note something of the attitude of those sects of Mahayana Buddhism who profess the doctrine of the Pure Land. As we have already seen, they teach that Jodo or the highest heaven may be gained solely by faith in Amitabha (the Dharmakaya). Accordingly, to them asceticism in any guise is unknown, and like the Protestants, who, teaching practically the same doctrine as these sects, have done away with many of the fasts and penances of the Catholics, so has the Jodo or Sukhavati school (to give it the Sanskrit name) abnegated many of the practices of the salvation-by-works branch, and the most powerful branch of the sect in Japan, the Shin Shu, even allows its priests to marry and eat meat, etc.

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[21] For a striking illustration of the steady adherence of the Hinayana priests to the idea of non-resistance, see Fielding Hall, *The Soul of the People,* in the case of the British invasion of Burma.

It must not be supposed from this, however, that they have done away with morality in the ethical sense of that word, for we find them even more insistent than their brethren of the salvation-by-works school upon the necessity of every one, layman and cleric alike, leading a pure and holy life. With them, however, besides ordinary moral duties, there is the necessity of repeating the formula *Namu Amida Bu* or *Butsu*, frequently contracted to *Nembutsu*.[22] With one branch of this school the very reciting of the name is in the nature of a meritorious deed and accordingly whoever does so worthy of rebirth in the Pure Land, but in the Shin Shu the mere reciting is of no effect, but is simply a sign of faith in Amida, like the Protestant idea of the nature of good works after justification.

V. MAHAYANA BUDDHISM TO-DAY.

The Origin of Mahayana Buddhism.—Now just a word as to the origin of Mahayana. Many persons who are but little acquainted with the subject are under the impression that Mahayana as it is to-day, is a purely Chinese and Japanese product, or in other words, that it is the result of the failure of the Japanese and Chinese minds to understand or receive the doctrines of pure Buddhism as it was originally preached to them. This is entirely a mistake, for although Mahayana has acquired several new phases since its introduction into the Far East, yet we shall find that as far as all essentials go, the doctrines of Mahayana may be traced back to the native home of all Buddhism, India.

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[22] The exact translation of this phrase is, *namu* "praise (to)," *Amida* a contraction of Amitabha, the Dharmakaya, and *Bu* or *Butsu* a contraction of Buddha, Amida being regarded as the great universal Buddha. Jodo priests and laymen go through their rosaries several times a day reciting this name, and the Chinese characters for the phrase are engraved at all sacred places of the sect, thus having the advantage over the Christian monogram, IHS, in that it can both be seen and heard.

Buddhism was originally far more elastic than at present; accordingly we find in the first centuries after the death of the Buddha, widely different aspects of Buddhism existing side by side in a somewhat nebulous state. The bases of all later philosophies may be found there, but practically undeveloped, and often not clearly expressed. As time went on, these various phases of Buddhism gradually hardened and crystallized, the differences between the various schools were noted and harped upon, and we may notice the gradual drawing apart of several chief divisions. These divisions and schools are too numerous to be touched upon here, but they may be classified in a general way into the two main trends of thought which later developed into the schools of Hinayana and Mahayana as they exist today.

Early Patriarchs of Mahayana.—Since, then, Mahayana was a gradual development, and not the result of the teaching of one man or school (unless, of course, we admit the Mahayana claim and say that it was Gautama), it is obviously impossible to point to any one person as the sole founder. One or two names, however, may be mentioned as being those who were most influential in developing and spreading its teachings. Thus we have Parçva and Punyayaças, both of India. They are chiefly known as being the teachers of Açvaghosa, from whose writings we have already quoted, and who may be regarded, more than any one else, as the father of modern Mahayana. Of Açvaghosa's life we have only conflicting and unsatisfactory accounts, but it may be said that he lived somewhere about the beginning of the Christian era and was originally one of the leaders of the anti-Buddhistic Brahmans; he was converted to Buddhism and spent the remainder of his life, honored both by the nobles and the people, in propagating the doctrines of Buddhism as he understood them.

As Açvaghosa presented them, however, the doctrines of Mahayanism were still somewhat indistinct and unformed; but two or three centuries (accounts vary, some say less than a century) afterward there arose Nagarjuna, also an Indian, who made it his life's work to systematize its doctrines, and under whose endeavors Mahayanism took practically its present shape. Mahayanists are fond of calling Nagarjuna the second founder of Buddhism. From this time on it is impossible to trace the history of the new faith in detail. About 53 A. D. Buddhism was first introduced into China, where in spite of various persecutions under antagonistic rulers it continued to thrive. While the doctrines of Hinayana found favor in Burma, Siam, and Ceylon, those of Mahayana, as they were gradually elaborated, appealed more to the Chinese tastes, so that in the Far East Mahayana continued to flourish long after the destruction of the mother church in India. Buddhism was introduced into Korea in the fourth century A. D. and into Japan in the sixth.

Division into Sects.—With that knack of elaboration and hair-splitting for which the Oriental mind is so noted, the doctrines which Açvaghosa could explain in a short monograph were gradually expanded until Mahayana came to include as it does to-day about 84,000 doctrines. Now it is manifestly impossible for any one organization to deal equally with each and every one of such an enormous number of ideas. It must needs content itself with emphasizing one especial phase or aspect of the religion taken as a whole, while admitting in a general way the truth of the various other aspects. Accordingly we have the various sects and schools of Mahayana Buddhism, each one of which considers the phase which it presents as being of especial importance and the most vital and essential to enlightenment. We find in them elements appealing to the scientific, to the religious, the philosophical, the mystical, and the occult types of mind, to the educated and the uneducated, the deep and the superficial, and in the various sects which exist to-day, every person must find at least one which appeals to his own type of mind.

These sects are far too numerous even to mention them all, much less to go into details over their teachings, but a word must be said concerning the most interesting and important ones. Speaking generally, as we have already noticed, the Mahayana sects may be grouped into two main classes, those who follow the path of salvation by works, and those who adhere to the principle of salvation by faith. In China the latter, while influential, have not succeeded in gaining universal acceptance, but in Japan they hold the allegiance of about half the Buddhist laymen.

The Tien-Tai Sect.—Chief among the former or salvation-by-works school, comes the Tien-tai (Japanese Tendai) sect, which is one of the most scholarly and influential. It was founded in China, its head monastery being on Mt. Tien-tai (whence its name), but it early manifested a missionary spirit and after having quickly overrun Chōsen or Korea, it was brought over from there into Japan about 600 A. D., being the first Buddhist sect to be introduced there. Owing to the power of Shotoku Taishi it succeeded in gaining a hold in spite of early adverse circumstances. From that time on, both in China and Japan, it occupied a very prominent place, many of the emperors and nobles of both countries giving it their allegiance, owing to which fact it may be said to occupy a position somewhat analogous to that which the Anglican Church would occupy if disestablished, though within the last few centuries it has somewhat declined in influence. Its principal Sutra is the Sutra of the Lotus of the Good Law (*Saddharma Pundarika Sutra*), but the sect is not noted for any special feature or doctrine, though maintaining in a general way the ideas outlined above. It may be regarded as strictly orthodox, and manifested a tendency to persecute the innovations which Shinran, the founder of the Shin Shu, strove to bring about.

The Dhyana Sect.—Another powerful sect, both in China and Japan, is the one that goes by the scholastic name of the Sect of the Buddha Heart, but which is popularly known as the Dhyana sect (Jhanna in Pali, Shan in Chinese, and Zen in Japanese). The word signifies meditation or religious contemplation, and from this something of the nature of the sect may be understood. It is often termed the Quakerism of the Orient, since it declares the Truth to be locked up in the heart of each man, and teaches that it can be unlocked by a proper system of meditation. While other sects found their teachings upon one or two Sutras, Zen professes to revere them all equally, or really to ignore them all equally, since it looks upon all externals, such as Sutras, etc., as being purely incidental (and often obstacles) toward the gaining of enlightenment.

One of the most noted things about this sect is its system of *kung-ang* (Japanese *ko-an*), or words or phrases with a hidden meaning which are given to each student to elucidate. One or two instances will give the reader some idea of their general nature. A monk once asked Tung-Shang (Jap. Donzan, 806-869), "Who is the Buddha?" to which the master replied, "Three pounds of flax." A somewhat similar story is recorded of Mu Ping (Jap. Mokyo) who when asked the first principle of Buddhism replied, "What a large melon is this." Each of these ko-an are supposed to be answered by one word. Here indeed is esotericism with a vengeance![23]

Bodhidharma, in the sixth century, was the first one to introduce this sect from India into China, where his fame soon attracted several influential followers, which insured its success. From China it was brought over to Japan in 1191. It is considered the most philosophical of the sects, and has all along held the allegiance of a large portion of the upper classes of both countries.

The Mantra Sect.—Of almost purely Japanese origin is the Mantra (or, to give it the Japanese name, Shingon) sect, one of the most mystical and hair-splitting of them all. It dates back to the time of Kobu Daishi, in the ninth century, who after mastering the principles of several other schools, felt that he had a revelation commanding him to combine the teachings of Buddha with those of Shinto, the ancient native faith of Japan. As the result of his influence, both direct and indirect (for his indirect influence was even greater than his direct influence), so thoroughly were the foreign and the native faiths intermingled that when after the restoration of the imperial power in Japan, an attempt was made to separate them, it was found almost impossible to do so, so much had one faith borrowed from the other.

The Shingon Shu bases many of its doctrines upon a supposed work of Nagarjuna (see above) entitled the *Mahayana-çastra-vyakya,* a deeply mystical work, but which outside of Shingon circles is generally supposed to be spurious, though it is certainly very ancient. As a matter of fact, Shingon approaches more nearly to Hinduism and Vedantism than does any other sect. Its most noticeable feature is its multiplicity of gods (most of them personifications) who are strangely and categorically arranged into thirteen main divisions, as well as the fourfold division of North, South, East, and West. In spite of this, however, Shingon is monotheistic (like the other Buddhist sects) in the sense that it admits that there is one supreme threefold Deity, an unmanifested God, sometimes called Abrakakia (corresponding to the Gnostic Abraxas), and a manifested God, Vairochana, corresponding to Amitabha (in Shingon, however, Amitabha is the title of a lower deity) or the Dharmakaya.

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[23] More about these *ko-an* may be found in the author's article "The Development of Japanese Buddhism," *The Open Court,* February, 1919, p. 107.

The Sukhavati or Jodo Sects.—Now we come to an examination of the salvation-by-faith-alone school. Researches have shown, contrary to general expectation, that the ideas presented by this school are considerably older than was at first considered possible, since we find them in their rudiments common in the times of Açvaghosa and Nagarjuna, and we often find these patriarchs preaching similar ideas themselves. The doctrine was then fully elaborated in China, where we find among others Zendo and Donran (to give them their Japanese names) bringing out the conception more explicitly.

It was not, however, until Buddhism was introduced into Japan that the doctrine as it exists to-day commanded any attention, when in the twelfth century we find Genku, or as he is sometimes called, Honen Shonin retiring from the Tendai sect to preach that for those for whom the narrow path of justification by one's own efforts was impossible, there was the path of justification by faith in Amitabha. Shodo-mon, the salvation-by-works school, taught that a man continued being reborn in this world until he attained Nirvana, which it must be remembered may be attained anywhere. Genku, however, while teaching that this was true, maintained that is was also true that a believer might be reborn in the Pure Land, where enlightenment could be more easily obtained.

Genku retained the original discipline of Buddhism, but his illustrious disciple, Shinran Shonin, while changing but slightly the theology of his teacher, did away with the celibacy, the abstention, and the vegetarianism of the monks. Accordingly to-day, the priesthood of the sect which he started, the Shin Shu Jodo (True Sect of Pure Land) as it is called, is hereditary, the patriarchate of the various subsects passing from father to son.

The Nichiren Sect.—As was natural with the case of the Shin Shu, where the rules which he had laid down were abandoned, Gautama received but scant attention on their part, and his images were often cast aside. It was the sight of one of these battered images that was being played with by children in the street that proved to be the turning-point in the career of the famous Japanese priest, Nichiren, who was born A. D. 1222, the son of a fisherman. Except for this humble beginning, the life and character of Nichiren corresponds very closely to that of the Englishman Wesley. Nichiren after his conversion abandoned the more conservative and staid ways of spreading his gospel and revived the practice of vehement street preaching. Like his English parallel, Nichiren was somewhat bitter in his denunciation of the other existing sects, and alone among the present Mahayana schools, the sect which he started still maintains an attitude of exclusiveness and hostility.

Nichiren had little to add to the religious speculation of his time save a rabid zeal for devotional affairs. He assumed an attitude midway between the salvation-by-works and salvation-by-faith schools, declaring that works were of importance, but that the reciting of the phrase *Nan-myo-ho-ren-gekyo* was also of great benefit. With the Tendai sect, he took as his principal Sutra the *Sad-*

dharma Pundarika Sutra (the Sutra of the Lotus of the Good Law), but so much emphasis did he and his followers lay upon it that they are often called the bibliolaters of Buddhism. Nichiren has at present about two million followers, almost all of them in Japan, and they are chiefly known for their gaiety and light-heartedness in the observance of their religious customs in contradistinction to the somewhat graver behavior of their fellow Buddhists.

The Relation of the Sects.—Such, then, are the more important and interesting of the sects of Mahayanism. In addition to these, there are also numerous others, but the latter are either of too little numerical importance or else their doctrines are possessed of too little distinction to warrant special attention. Furthermore, there are in Japan and China three Hinayana sects. These have neither priests nor temples but are merely studied by the other sects. Finally, there is Lamaism, the religion of Thibet, differing in many respects from the other Mahayana sects but lying outside the scope of this discussion. In Japan all the sects are still flourishing, though they have practically all broken into smaller subdivisions, but in China, where Buddhism is at a much lower ebb than in Japan, the only divisions that exist are between the priests of the Yellow Robe, in which are combined more or less perfectly the different sects which have been enumerated above, and those of the Blue Robe, or the Lamaistic priests, who acknowledge the Grand Lama of Thibet as their spiritual leader.

As has already been seen, however, while Mahayana is divided into many sects and factions, yet almost universally do they give recognizance to one another, each claiming for itself only that it emphasizes the more important features of the Mahayana faith. Even the schools of salvation by faith and by works differ but little in reality, since the Sukhavati sects teach that while by faith a man may gain admittance into the Pure Land after death where it is easier for him to realize the "truth which shall make him free" (to use Christian verbiage), yet must he come back to the world for the salvation of all; the opposite party teaches that while a man is constantly being reborn on earth, yet must he finally reach the Pure Land and Nirvana. They are but two ways to the same end, says the Buddhist.

The Present Position of Mahayana.—A word must be said before closing concerning the present condition of Mahayana Buddhism. Soon after the opening of both Japan and China to the world, Buddhism underwent a gradual but rapid decline both on account of the Christian missionaries on the one hand and of materialism on the other. Many of the monasteries were deserted and were sold or turned over to the government to be used for other purposes, and it seemed to all parties as if the days of Buddhism were numbered. Within the last few years, however, a reaction has set in, a reaction which promises to be quite as radical if not more so than when the pendulum swung the other way. When Christianity first entered China and Japan, Buddhism had, to no small extent, sunk into decay. Lately, however, with the advent of opposition, has come a revival of the old missionary spirit, and accordingly we find Buddhist schools and colleges being erected, newspapers and magazines started, and extensive missionary courses given, which have resulted in an increase of religious fervor and piety. In addition to all this, we even find at times extensive plans being made for missionizing abroad. It is impossible, of course, to tell what the future of this new movement will be, and possibly the revival of the Buddhist faith may be illusive and temporary, but certainly if present indications are correct, the Phœnix of the new Mahayana Buddhism is arising from the ashes of the old.

WM. MONTGOMERY MCGOVERN.

KYOTO, JAPAN.

THE SECRET.

THAT which was in the beginning is neither young nor old;
It started not; it was formless thing, with no texture or fold.
'Twas endless unlimited mass, without distinction of parts.
It never engendered the maddened stroke of lightning which darts
With power formidable into places that knew it not;
Unmoved it was, nor good nor evil, nor cold nor hot.

No longer this substance stands in its pristine state apart;
It yields to the hand of man and is moulded by his art
To shapes which please his fancy or serve the purpose he forms.
'Tis stirred by the ebb and flow of movement, and heavy storms
Now beat upon it part upon part.—What we see grows old;
That which was in the beginning is now lost from our hold.

Through ages long and by changes many and moving slow
Was part from part separated, becoming stone or snow
Or air or man; and whence or by what process they came
Is not revealed in the forms that now our notice claim.
No memory reaches back, and searching alone can find
The intricate secret which is hid from the view of mind.

In Man yet deeper grows the longing this secret to know.
To-day he labors with power, and not is his progress slow:
The past he penetrates further; forth he reaches his hand;
The truth he will find if record there is on sea or land
Or in the firmament, or the future can make it known
By throwing its light where once the light of the past hath shone.

—O, hasten, glad Day, when Man by search this knowledge shall find
And matter shall yield its longest-treasured secret to mind.

R. D. CARMICHAEL.

SCIENCE AND RELIGION.[1]

IF science and religion are to continue to coexist it seems opposed to the conditions of modern thought to admit that this result can be brought about by the so-called "water-tight compartment" system which, even at the present time, is frequently extolled or considered possible.

On the one hand, indeed, modern science, after invading the domains of psychology, sociology, and morals, lays claim to study and examine every form of human life, without exception.

On the other hand, religion is conceived either as pure feeling or as a blend of feeling and knowledge. In the former conception, science regards it as but a crude datum which it must explain in accordance with its own principles, by bringing it analytically within the compass of scientifically known phenomena. Again, if it participates in knowledge, it cannot be radically isolated from science, for we cannot conceive of the possibility of two wholly heterogeneous truths.

In the following, science and religion are to be brought face to face with each other. The question, however, of the conditions that would bring about an intelligible relationship between two really distinct terms, is anything but simple. Identity is only a logical fiction; non-contradiction, a limitative condition. On the other hand, simple juxtaposition forms just that empirical relationship which we have here to supersede and, if possible, exalt into one that is intelligible.

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[1] [Argument for discussion by the *Société française de philosophie* at a meeting held November 19, 1908. Authorized translation by Fred Rothwell.]

Philosophy has been seeking, ever since the time of Plato, in Descartes, Leibniz, Kant, and Hegel, for a kind of connection which should be alike concrete and intelligible. Besides, there is nothing to prove that there exists only a sort of concrete relation: it is quite possible that there may be between religion and science a connection that is both intelligible and *sui generis.*

II. What, exactly, are the terms we have to bring together? In these days it is evidently less science and religion as objectively presented systems, than the scientific and the religious *spirits.* It is the scientific spirit which, by its own methods and from its own point of view, leaving out of account the results at which it arrives, sometimes regards itself as the negation *a priori* of the religious spirit. The latter in turn would regard itself as abdicating its position did it admit that its very existence could wholly be explained by scientific methods.

But do not the scientific and the religious spirits, when confronted with each other, appear to be in a relation of strict contradiction—a fact which, in the eyes of any man who respected the fundamental laws of logic, would immediately settle the question? Such a relation of contradiction might have existed between a scientific spirit imbued with dogmatic metaphysics, and a religious spirit identified with the letter of any positive religion. It is but right, however, to distinguish between the dogmatic scientific spirit and the strictly scientific spirit, or the sense of the superiority of experience; and also between the materialistic religious spirit and the strictly religious spirit, or the sense of the supremacy of the ideal.

Between the scientific spirit and the religious spirit, both strictly so called, there is no logical contradiction Still, might not there be heterogeneity, pure and simple?

Shall we find the ***intelligible relationship*** between these two terms which we regard as demanded by the modern mind?

III. In what is strictly called reason, we possess a principle of judgment which enables us to give an impartial estimate of religion and science in so far as reason, in the concrete elements that distinguish it from simple logical mechanism, is made up of those data of science and life which the human intellect has comparatively succeeded in universalizing. And so it is for reason to examine the problem, and from its standpoint we now consider the matter.

1. Is science self-sufficient?

It is, practically speaking, from the scientific point of view. From that of reason, strictly so called, it is not, because it has for a condition that things should be given, and given things presuppose activities that produce them. Besides, science is not mechanically produced in the human mind; it presupposes original investigation, and this also is activity.

Science presupposes life.

2. What are the conditions of life, or more precisely, of human life?

For man, a being endowed with conscience, this problem not only signifies: In what conditions can human life, such as it is, exist?—it also signifies: In what conditions is a strictly human life possible and can it acquire all the power and excellence of which it is capable?

Reason may ask the second question as well as the first.

If, after asking this second question, we try to find its solution in history and in the human conscience, we see that a strictly human life, the life that tends to all that is best, necessarily implies, (1) a faith; (2) the representation of an ideal; (3) a sense of love corresponding to this faith and ideal. These three elements, when precisely analyzed, appear to be extra-scientific. Now it is just these which with ever-increasing distinctness constitute the form of the religious spirit.

Religion, then, is the higher motive principle of the human soul, the principle which enables it to transcend itself.

3. Religion is connected with science through the medium of life. Science brings reason to admit the reality of life. Religion supplies man with the means of imparting to his life the utmost possible power and value. In man, as he is presented to us, the will to seek the best has its principle, immediate or mediate, perceived or unperceived, in determinations which are the province of the religious spirit.

Thus the relation of religion to science is neither analytical nor synthetical. It is a relation that is contingent and yet rational. It is a progress wherein liberty is entreated without being compelled. Strictly speaking, it is a passing from fact to action or true being, and from being to power and to what ought to be.

IV. Is this theory satisfactory, respecting the scientific and the religious spirits?

1. In the name of science, the objection may be raised that while an incomplete science admits of the conception of activity, of the possible and the obligatory, as veritable realities, a complete science would reduce these notions to subjective illusions.

But can there be a complete science? Is being from all eternity a thing that is made, with the result that, once all the laws of nature are known, nature has nothing more to do than conform to the dictates of science? Or does being really come about with time, so that it is forever indispensable to observe it in order to become acquainted with it? It seems as though we should be begging the question if we expected being to conform to science, and not science to being.

2. In the name of religion, the objection may be urged that the given religions contain many other elements than those just mentioned, and that to establish the legitimacy of religion in its purely formal aspect is but a poor justification of it.

It is clear that faith, the representation of an ideal, and love,—which are simple forms of will, intelligence, and feeling,—are by themselves only a frame in which each nation and individual, according to knowledge and character, tends to set a content increasingly true and worthy as well as capable of determining human life.

It remains certain, however, that the matter of given religions presents a truly religious character only if it is in harmony with this form. To have religious ideas, it is not sufficient to utter the name of God; while, on the other hand, it is possible to retain the thing though its name be changed.

The pure form of religion is still but an abstraction, because it is only those things that can be grasped by sense or imagination which appear to us as real. The letter, however, though indispensable to the spirit, is not to be confused therewith; it is a variable compromise between the spirit and the changing conditions of the environment in which the spirit must find its realization.

I.

Is the question of the relations between science and religion, which has exercised the human mind during the past few centuries, still a living one? Does it not now seem to consist of a rivalry between persons and powers, rather than of a genuine conflict of principles? I imagine that many, nowadays, are inclined to believe that we have at last found the magic syllables which must insure peace once for all, in the word *separation*:

> "Wenn sich zweie lieben sollen,
> Braucht man sie nur zu scheiden."

Science, it is said, comes within the sphere of reason, and religion within that of feeling. Why should there be any conflict between these two powers—alike essential—of the human soul? If religion remains pure feeling, and science restricts itself to storing the mind with the laws that control the mutual relations of phenomena, then we cannot see how religion and science are ever to meet. They occupy two worlds outside of and alien to each other.

Up to a certain point, this separation may be realized in a society. It is seen to exist, indeed, in the consciousness of certain individuals who, in accordance with physiological, if not logical, laws, simultaneously accept different principles which they do not compare with each other. Still, in theory and for the future, the so-called "watertight" system is no longer adequate to decide upon the relations between science and religion.

We live in an age of world-wide communication and comparison: nations, social classes, literature and science, art and life, society and individual, certain sciences set over against certain others, respectively clash and struggle for existence. Religion cannot possibly prove an exception to this law and stand unshaken by simply ignoring in the world the existence of everything save itself.

In more exact terms, science having successfully applied itself to biology, psychology, and sociology, as well as to mathematics and physics, perceives no limits to its sphere of influence, and professes to explain, along the lines of its own determinism, the appearance of religious as well as of all other phenomena. What matters it if religion exists wholly in feeling? A feeling is a mental state, consequently an object whose conditions of existence come within the scope of science. Science will demonstrate why, given my temperament and my environment, I was bound to have certain religious tendencies, just as it demonstrates why I was bound to incur some particular illness.

Religion, on the other hand, driven back into the inmost depths of consciousness, becomes so feeble that it can no longer be recognized. What is there in common between this flickering, self-centered spark, afraid of being seen because an effort would at once be made to extinguish it, and the all-devouring fire which once professed to inflame the universe: Γενηθήτω τὸ θέλημά σου ὡς ἐν οὐρανῷ καὶ ἐπὶ γῆς!

Every true religion, in the first place, possesses an intellectual content, and in the second place, aims at manifesting itself in the world.

It may be that, in certain individuals, a radical dualism of religious faith and scientific knowledge is maintained, just as in certain treatises on psychology we find the material separation of the faculties; but neither the human consciousness, taken in its essence, which is unity and harmony, nor our modern societies, which by means of journals, reviews, and meetings of every kind are constantly bringing different men and different doctrines in contact with each other, will indefinitely maintain the coexistence of science and religion unless there exist between the two, intelligible relations of compatibility and harmony.

* * *

What method must we follow to discover whether it is possible for science and religion to harmonize in an enlightened and introspective consciousness?

It is possible, following along experimental lines nowadays so prevalent both in philosophy and in other sciences, to set forth a method which consists in taking a few remarkable instances of individuals who have reconciled and are now reconciling strong religious convictions with the cult of science, and trying to find by a process of analysis how in the consciousness of these men the reconciliation between the two disciplines comes about.

This purely descriptive method, however, will not supply us with results apt to influence our own conduct unless the reconciliation effected in these consciousnesses appears to have real value, not only from the point of view of the individuals in question but in itself, in other words, an objective value.

In order to find out objectively what is the relation between science and religion, shall we appeal to history? Will the study of the origin and of the vicissitudes of religion and science determine what it is that constitutes the essence of both alike?

But, then, according to the law of evolution which nowadays is held in such high esteem, both may have changed very considerably, and if we are dealing with ourselves here and not with others, if we inquire at the present time with what conclusion we are to side in order to live a life that conforms with the present state of the human mind, we shall require to consider religion and science as they appear at the present day, not as they may have existed among prehistoric peoples, or even in a society that immediately preceded our own.

What does this mean except that we must deal with the problem, not from the point of view of descriptive psychology or of history, but from that of reason?

We have only to arrive at an understanding as to the meaning of this word: reason. Is it the sole characteristic of reason to reduce the relations of difference given to us in nature to relations of identity and contradiction, in such a way that, if two things cannot be reduced to one and the same essence, they may be declared incompatible? If this is an idle dream. Science is nothing else than the continual progress of the human mind, seeking for the explanation of things in things themselves.

And no less chimerical would it be to compare religion, as an *ensemble* of positive dogmas and determinate practices, with science as it is at present offered to us. In this case, which religion should we take? What value would the harmony or the disharmony established between science and some particular religion possess in the minds of those who profess a different religion? For even in these days, when we consider both dogma and practice, there is a striking difference, in the very heart of Christianity itself, between a Scotch Presbyterian and an Orthodox Greek.

Again, even if we thought we had set up an agreement between dogma and science, should we not in this be deceiving ourselves? Have words the same meaning in the religious as in the scientific order of things? If the man of science admits that there is no scientific law incapable of being belied by facts, does he thereby mean that science recognizes the possibility of a miracle as the production of a fact outside of all physical laws? Or does he not simply mean that, along with the known laws of our science, there may be cooperating others which are still unknown, and which may thus determine results that are at present inexplicable?

Neither the harmony nor the disharmony of present-day science with any particular body of religious doctrines, when we come to analyze it, has any real philosophic bearing.

At bottom, the conflict is far less between science and religion as given facts, than between the religious and the scientific spirits.

The scientific spirit consists in eliminating from the explanation of a given phenomenon, every cause that is not itself phenomenal, in explaining facts by facts, nature by nature. Science has made the discovery that, in nature, not only are there laws or relatively permanent connections between facts, but that these laws come under one another so that we may set up the ideal of bringing them all under a single one.

Religion requires that each phenomenon, taken separately, shall be the object of a special decree emanating from a supernatural power, and that nature, in some of these phenomena in particular, shall testify to the operation of forces which do not belong to nature. For science, being is a unity and it is nature that is this being; for religion, being is a duality: it includes, apart from nature, God, who transcends it infinitely.

* * *

Such is the real conflict, and we must recognize that it is far more profound than the opposition between a given scientific doctrine and some particular religious dogma would be.

It is not difficult to set forth the relation between the scientific spirit and the religious spirit as forming a regular contradiction. According to this view, we may say that science is the negation of the supernatural, and religion its affirmation; science depersonalizes all things, religion looks upon personality as their foundation. Science is explanation, religion is mystery.

It is clear that if, yielding to a taste for logical contrasts, I define nature as a system of mechanical forces and life as a spontaneity, the statement that there should be life in nature appears to be contradictory. For all that, life does exist in nature. We must beware of creating, by means of our concepts and verbal antitheses, contradictions which possibly correspond to nothing real.

What, then, are the scientific spirit and the religious spirit in reality, not according to some academic concept or other? Up to quite recently, the scientific spirit might have been defined as the conviction that things are reducible to universal mechanism and determinism. Nor is it even nowadays a rare thing to hear religion defined as a belief in the possibility of miracles as an infringement of the laws of nature.

If we define religion and science in this way, no doubt the difficulty is irremediable. Indeed, the one denies the very thing which the other affirms. To blend them in one and the same consciousness, we must abandon the principle of contradiction.

But then, do such definitions still correspond to reality? Science is at present essentially experimental; hence it appears as though the mechanical form of determinism which was considered inherent in the laws of nature itself, were but an abstract conception, added by the dogmatic metaphysical spirit to the real laws of things from without. A science that affirms mechanical determinism as being in things themselves and not merely in a certain metaphysical conception of things, ceases to be simply experimental: it is a philosophy of science, not plain science alone.

On the other hand, the simple statement of the extreme variety of religions compels the philosopher to distinguish between religions and religion, and to endeavor to find, by the aid of reason, what there is truly characteristic and original in the religious spirit.

The idea that religion is essentially the belief in a power which at one time leaves nature to follow its course and at another opposes it, is inseparable from a conception of science according to which we should be enabled to know certain natural laws as absolutely simple, primary, and universal. This way of interpreting natural laws is nothing else than regarding the laws of nature as belonging to the same category as laws decreed by a legislator. In this latter case, the law is first decreed, and afterward either obeyed or violated. Scientific laws, however, are not prior to facts; they recapitulate them. If a law is violated, it is not because an opposing power has intervened, it is either because the law in question did not possess the generality attributed to it, or because some other law happened to be involved in the phenomenon, or again because the latter does not come under our present scientific categories. Laws are devised for the explanation of facts; facts are not like those examples in old grammar-books, showing us the language as a rule obedient enough, though at times quite opposed to the laws and precepts of the grammarians.

Along with the transformation of dogmatic into experimental science, there disappears the notion that a miracle is an outrage upon nature; religion can no longer consist in devising and coaxing forces which are stronger than those of nature, which are therefore homogeneous with these, therefore natural still, and which have, in reality, the same claim to come within the compass of science as have laws actually discovered. The force that produces thunder was supernatural so long as it could not be brought within the compass of electricity.

As against modern experimental science, the supernatural can no longer be interpreted in a material sense, thus regarding it as a still natural and simply unexplored essence. It can only really be distinguished from nature if it is strictly spiritual, that is to say, if it is the expression of spirit as life, action, creation and realization of the true, the just, the beautiful, the good and the ideal, in opposition to matter as the supposedly permanent, homogeneous, and identical foundation for the sum total of phenomena.

In other terms, whereas the principle of science, whose object is to determine, classify, and systematize the relations of things to one another, is the supremacy of experience; the principle of religion is the supremacy of the ideal. The religious spirit believes in the existence, the autonomy, and the power of the ideal, along with all those attributes that we regard as necessary for its existence and efficacy.

Thus conceived, the religious spirit and the scientific spirit evidently do not hold to each other that relation of logical incompatibility apparent when they are both interpreted in a dogmatic and materialistic sense.

Science takes into consideration objectively given phenomena and their mutual relations: it knows nothing of their generating causes. It is based on the postulate that it is useless for us to inquire into the cause that produces phenomena, in order to be enabled to connect them with one another, to classify and systematize them; along these lines it systematizes only so far as observation will allow.

Religion is connected with the springs of being. It is not simply a moving body of feelings, an instigator of actions; it is itself feeling, thought, life, action, the direct relation of souls to one another, the converse and communion of spirit with spirit.

Hence it does not interfere with science, for, in whatever way its action is expressed in the world of phenomena, it admits that its external manifestations shall be objects of science, exactly like all other phenomena. It does not inquire what will become of the scientific explanation of the final residua of its actions. How can the brain that generates thoughts be concerned regarding the name of the chemical substances which will be found in its ashes?

There is no contradiction between the religious spirit and the scientific spirit, as men have imagined. All the same, we have stated that, in order to maintain equally two different principles, it is not sufficient that human reason should see them actually coexist, it must discern between them some intelligible and rational relation which will make of them not simply two objects set alongside of each other, but the conjoint elements of one and the same harmony. Is there such a relation between the religious and the scientific spirits, that is, a relation not only of non-contradiction, but of mutual conformity?

III.

What, exactly, is the point of view from which we must examine this question? It can neither be that of science nor that of religion; for then the problem would already have been solved, though in two contradictory ways. Is there a third point of view?

That of reason, strictly so called, appears to satisfy the conditions required. Reason is not the principle of religion, for it is essentially intellectual and universal, whereas religion is life and personal consciousness. Reason cannot be confused with the general form of science, for the latter tends to reduce the diverse to the identical, whereas reason aims at maintaining and reconciling, while respecting their diversity, all modes of being which seem to it to possess real value.

What is reason?

It is but too evident that it is not simple logic. Logic is relative: such or such a principle being admitted, by hypothesis, it is logical or illogical to deduce therefrom such or such a conclusion. Reason comes to an immediate pronouncement: this may be logical but it is not reasonable.

Reason is not an *ensemble* of innate, immutable principles, laid down *a priori,* as dogmatic metaphysicians supposed. It is not the revelation, inscribed on the tablets of our consciousness, of a transcendent stereotyped truth that has come down to us from all eternity. It is not ready-made but makes itself, and has a history of its own. It is formed, as Descartes saw, of the scientific knowledge and practical experiences on which our intellect is nourished. It is that portion of the data of science and life which human reflection, speaking relatively, has universalized.

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If reason is such, is there any connection between science and religion, from this point of view?

Take science, first, for it is science that at the present time demands the assent of our reason immediately. In scientific experience, strictly so called, it possesses a material guaranty of universal value which cannot be found elsewhere.

Science, from its own point of view, is self-sufficient. For its self-construction it has nowadays nothing to do with transcendent principles or ends. It is reduced to a mode of determining facts and their observable connections. Does it follow that it is self-sufficient from the point of view of reason?

Science accepts things as given; its duty and honor consists in absolute submission to the conditions of this given. Being fundamentally experimental, it will always refrain from pronouncing upon the first elements of this given, or upon the principle according to which this given changes. It is indebted for its very existence to the strange circumstance that certain aggregates, certain complex connections, are in nature relatively permanent. It has to do with—and can only have to do with—states, not with true causes.

It therefore follows that, in the sight of reason, science necessarily posits the existence of being as the model, radically distinct from itself, of which it endeavors to give us a translation that can be utilized, from the human standpoint. An adequate science, one convertible with being, appears a contradictory concept, seeing that science has become essentially experimental.

Nor is this all. Precisely because our science is other than being it requires expedients, modes of representation which, in all their elements, are not supplied by being itself. We are no longer living at a time when science sprang fully armed from facts, like Minerva from the brain of Jupiter. Science is concerned only with facts, but it is the human mind that constructs it. The human mind builds it up from concepts, signs, and symbols which it invents in order to deal, in its own way, with objects heterogeneous to itself. It imprints its stamp on facts.

And so, just as science presupposes being and is unable to reduce it, it also presupposes spirit of which it is the product. It is the living relation, daily more strict and subtle, of spirit with being.

What does this mean except that, from the standpoint of reason, science presupposes: externally, a creative activity that supplies it with matter for observation; internally, a similarly creative activity which contrives workable symbols, fitted to represent inaccessible realities.

Science presupposes life, both without and within ourselves.

In its turn, what is presupposed by the life of which we are conscious, that which concerns us directly, human life?

There are things without which we *cannot* live: in so far as we seek after these things, our life does not transcend in dignity the universal animal life. There are things without which we *do not will* to live: strictly speaking, it is the search after these things, materially useless, that stamps us as human beings.

What are these special conditions of human life?

Man seeks after certain things because he attributes to them an intrinsic value or worth. He does not consider them good simply because they either are or appear to him to be good. He subordinates himself to them, making his own goodness consist in adapting himself, submitting and sacrificing himself to them. The most precise manifestation of this faculty is the sense of duty, which is found to be the origin of every heroic act of the human will, and the disappearance of which cannot be imagined without our seeing human life change its aspect and fall back into a state resembling pure animality, from the moral point of view.

Now, the notion of absolute value, the notion of duty, cannot be reduced to strict knowledge: it is a matter of faith. It implies a risk, an adventure, a sort of logical absurdity. I do not know if what I attempt is possible, nor if myself and my fellow-beings will profit by it, but I know I ought to act so, whatever the consequences. To characterize such certainty, there is no other word than that of faith.

Still, while I believe in the duty of pursuing certain ends, I inquire of what it is exactly that these higher ends consist. Faith necessarily tries to attain to the knowledge and understanding of its object.

We may give the name of ideal to that supreme object, the pursuit of which is the essence of human activity. Each of the determinate forms we set up as an object to pursue is an intermediate term between reality as we see it and the supreme ideal. This latter is conceived by us as the perfection of truth and beauty, justice and good, consciousness and personality, in so far as this perfection is not only an abstract possibility but a necessary reality. The ideal is that which connects perfection and existence, their indissoluble unity.

Man, in a word, cannot limit himself to a contemplation of the ideal by his intellect, and a submission to it by his will. His union with the ideal can only be consummated by love, and the highest of all duties is that of loving. The pursuit of the ideal, individual perfection itself, presupposes the common efforts of human individuals. Not one of them could, by his own strength alone, become all he is capable of being, and do all he is capable of doing. The common love of the ideal and, at the same time, the love of men for one another, is a third trait of a fully human life.

Man, if he is to be fully man, must not be content with living, he must devote his life to the practice of duty, the search after the ideal, the communion of one consciousness with others in love.

Are these three objects: duty, ideal, and love, strictly natural?

Assuredly they are conformable to reason, which, of itself, perceives their necessity for the human soul. But then, our reason is a state, an actual form of our intellect, it is not a first principle. To say that a belief has its original cause in reason, is to act like a psychologist attempting to discover the origin of the various languages in the very rules that grammarians deduce from them.

It is remarkable that those objects which the reason regards as indispensable to a truly human culture, are just those declared to be preeminently religious objects in that one religion which is considered as among the greatest.

What is the greatest commandment of the law, Jesus is asked. He replies: Thou shalt love the Lord thy God with all thy heart, with all thy mind, with all thy soul, and with all thy strength: this is the first and greatest commandment. And the second is like unto it: Thou shalt love thy neighbor as thyself.

Duty, belief in God, love: the commandments regarded by Jesus as preeminent contain these three elements, and these three alone.

Now, the work of Jesus is manifestly a religious work.

And, indeed, if these three objects form only a part of what the religious consciousness generally comprises in the idea of religion, none the less do they come in reality within the scope of religion, strictly so called, and not of simple morals, or what is called natural religion.

The sense of duty may be recognized by the psychologist or the moralist as actually present in the human soul; but where does it come from and what is it worth? Kant himself sees that these questions cannot be answered by the human intellect, whose function it is to explain fact by fact, being by being: here we have to find the springs of being.

Similarly, the concept of God is that of an unobservable reality, affirmed to exist, from the very fact that it is outside of all knowable conditions of existence.

And love, deep within the life of the individual, is the creation of a fuller life, in which divers individuals hold communion and the personality, far from being effaced, becomes more distinct and original.

It is indeed possible, by changing the meaning of the words: reason and nature, to maintain that these phenomena are also explained by reason alone and nature alone, just as it is possible, in another way—concluding, like Saint Augustine, that man possesses nothing but what he has received—to attribute to divine action all that man imagines he thinks and does of himself.

In fact, we find that the historians of philosophy are for the most part more inclined to explain such concepts as the categorical imperative of Kant or the intellectual love of Spinoza by an influx of religious tradition, than to account for the evangelical doctrine of the gift of oneself by the reflection of natural reason alone.

This is because the notions of duty, ideal, and love bring into human life a profound dualism which is alien to the simple idea of nature and reason.

To try to find, apart from being, the way to modify being and make it more perfect, is the property of religious thought. If we insist on giving the name of rational thought to this thought, then, by an abuse of language, we are calling reason the very thing that religion calls faith, grace, God, Providence.

Thus, through the medium of the notion of life, religion is connected with science. The man who reflects on science is led to attribute a reality to his own life; and the man who would fully live the human life must believe in duty, hold up perfection as his model, and devote himself in love. Now, acting in this way, he opens up a way in his soul to what is called religion.

Thus interpreted, can the relation of religion to science be called rational?

Evidently this relation is not simply a logical one. Science neither contains religion nor does religion contain science. The transition from science to religion is possible; it is not necessary.

Is it then but a simple conjunction of fact, based on the ascertained statement that certain men, in the course of their life, associate evangelical dreams with the pure and scrupulous cult of science? The deduction we have just attempted goes beyond such a result as this. Whereas science considers that which is in its actually given being, religion goes back to the origins and initial determination of being. Its objective is the ideal and the possible, what ought to be and the realization of what ought to be.

Now, the passing from what is to what ought to be is not logically necessary, neither is it logically arbitrary and irrational; it presents that solidarity in contingence which is actually the kind of connection that reason applies itself to determine. It is a special relation, perhaps a unique one of its kind. Now, it is too simple a matter to deny the existence of a relation under the pretext that we see no way of reconciling it with the logical relations, strictly so called. Life is made up of relations that are extra-logical, and yet real. It is such a relationship that unites science and religion. Though particularly difficult to define, it is better to attempt an imperfect definition of it than to deny it *a priori*.

The relation of science to religion recalls, we might say, that of actual language, relatively fixed and determinate, to living thought, which is its soul and origin; or rather the relation of an artist's work, apparently endowed with an existence and a unity of its own, to the creative and free genius which gives this work not only its existence, but the very unity and logic that characterize it.

IV.

It may be that objections will be raised to the theory here set forth.

Scientists may allege that, though an incomplete science always leaves outside of itself some empty space into which religion may find its way, science *per se*, as a whole, explains everything, fills all the regions of being, and in consequence, relegates religion to the realm of idle fancy. In theory, we may say, if not actually, science resolves into data of experience the concepts of the possible, obligation, value, the sacred, the infinite, religious faith, feelings of divine love, divine presence and activity, as well as the chemical, physical, and mechanical forces. Science regards the word "inexplicable" as having no other meaning than "not yet explained."

Such, in effect, is the postulate of science. It is from this point of view that it interrogates nature. Still, a question is not an answer, and that the solution should do away with the datum is unintelligible. An experimental science presupposes a being set up for its observation; all it can affirm is that, at some particular moment, it has grasped all the generating principles of the things under investigation, and no longer needs to observe them.

Besides, how could it affirm that the future of being is wholly predetermined, from this time forward? Science, such as the progress of philosophy has made it, dwells on uniformities, analogies, correspondencies, but it neither attains nor seeks to attain to the origins and conditions, either of uniformity or of change, that reign throughout nature. It neither knows nor wishes to know if being is limited to being, or if it lives.

Science *presupposes* being, it cannot be substituted for it.

* * *

No doubt, also, we may foresee an objection on the side of religion.

Is it indeed religion, effective and concrete, with its own distinctive and specific characteristics, whose legitimacy has been established in the foregoing deduction? Have we really superseded so-called natural religion, so inadequate to the religious mind, or even simple rational morals?

It is somewhat difficult to reduce to unity or to a few leading points—so as to grasp and examine them all together—the objections that may be raised from this point of view. What are the component elements of a positive religion? The answer will vary according to the religion professed, each person being inclined to look upon all the parts of his religion as equally essential. Where is the line of demarcation between a natural religion and a revealed religion? What is the supernatural, what is revelation? Is the religion which, according to the preaching of Christ, may be summed up as love of God and love of one's neighbor, a natural or a revealed religion? Is the origin of the myths and rites, with which the religions of old were overburdened, to be found in genuine supernatural revelations or in the workings of man's imagination?

There is a mode of insisting that a religion shall contain revealed and supernatural elements, which tends to nothing less than the downfall of religions, the supernatural postulated being actually one that is decidedly incompatible with the conditions of modern science.

And there is a system of morals, a religion presented as natural which in reality is more than a mere system of morals, more than a simply natural religion, because it contains principles that cannot be reduced to being as given to us by experience, because it implies a supernaturalistic conception of nature itself. When Pascal writes: "Man infinitely transcends man," he means that in human nature itself, examined in its inmost depths, we find the supernatural and the stamp of divine activity.

Faith, the ideal, love, in their true meaning, are indeed supernatural elements, in the meaning that a sane philosophy attributes to this metaphor. And it is into the sphere of religion, not of morals only, that we are brought by the precept of Jesus: Thou shalt love God above all things, and thy neighbor as thyself. To give oneself, to sacrifice oneself, if necessary, in order to further the coming of an ideal kingdom, to draw one's strength, joy, and being from an invisible being whose existence our senses deny, how could such conduct be anything but religious? What other activity, distinct from this, is more religious?

Besides, the theory here set forth does not aim at reducing religion to its purely formal elements, and excluding its positive determinations, its dogmas and rites; on the contrary, it finds its natural complement in the other theory, that form demands a formula; it abides by the profound saying of Fichte: *"Die Formel ist die grösste Wohlthat für den Menschen."*

This should not be taken to mean that the concrete formula, matter, is simply to be deduced from form; a thing that can scarcely be conceived, and which Kant himself really never thought of doing.

Though the form of religious life is in some way necessarily present in the consciousness of the man who seeks, as Pascal says, to transcend himself in order to be completely human, its matter comes from either inspiration or tradition, written or oral; it is given by teachings and practices whose origin more or less escapes our observation, and in certain cases it also may be called supernatural.

In reality, this matter is more or less one with form. The more exactly it corresponds to form, the more it is deserving of respect and beneficially efficacious. It is modified, either in the meaning attributed to it, or in the elements of which it is made up, in so far as such modifications seem necessary to keep it in harmony with the sum total of human knowledge as also with pure religious feeling.

Religion is spirit, living spirit, engaged in transforming the entire world. The forms and practices which this spirit approves and adopts are those that enable it to accomplish its task.

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THE GENESIS OF CONSCIOUSNESS.

IT is often forgotten that the basis on which modern theories rest is narrower than that of their predecessors. Adam Smith did not think of himself as an economist but as a philosopher. So did Locke and Hume. Even John Stuart Mill spent as much time on psychology as he did on economic discussions. His *Political Economy* was an accident due to his failure to find a basis for a study of character. Utilitarianism, associational psychology, classical economics, and English philosophy have the same roots and the same background. The separation came through the failure of these disciplines to meet the conditions set by evolutionary theories. They went down to be revived again under new names by men who no longer thought of themselves as philosophers but as workers in science. Yet the new is merely the old order under modern titles. William James says pragmatism is a new name for an old philosophy. He is right, for Locke and Adam Smith were pragmatists even if they did not have the word.

To-day we think of behavior psychology as something new; yet it is merely a clearer statement of problems which earlier writers tried to solve by cruder methods. There is little difference in saying with Locke that the mind is blank, and in saying with the behavior school of psychologists that the content of consciousness should be ignored. Both schools agree that the sources of action are outside of consciousness. Both view human nature as the behavior of men seen in their daily life. This has become the economic interpretation of history if measured in its effect on masses and epochs. It is behavior psychology if tested by the reactions of individuals. It is Freudian psychology if sex impulse is emphasized. It is biology if human nature is broadened enough to include problems of heredity. All these sources make contributions to the new view, and only by their revaluation on some common ground can the unity be restored which gave force to the philosophy of the last century.

The older psychology was a soul philosophy in whose terms all was explained. In the transition from it to nerve psychology it was assumed that the nerve did what the soul was supposed to do and in a similar manner. For every soul function a nerve was sought which performed mechanically what the soul was thought to do. Old concepts were thus retained under new names which could not stand an examination on their own ground. Psychology can free itself from the resulting confusion only by ceasing its endeavor to make nerve action correspond to the predicates of soul supremacy and by putting in their place known facts as exemplified in bodily activity. We should study nerves in their objective manifestation as behavior before we try to observe their effects on consciousness. What the body nerves do brain nerves also do but nothing more. If there is a discrepancy between these known powers and those manifested in our conscious life we should attribute the difference to some other force or to some complexity not yet understood. This method does not invalidate either what we know of nerves or of consciousness. It merely warns us against hasty identification and slipshod methods of passing from one to the other.

To understand our bodies we should start from the simple functions of assimilation, circulation, and muscular activity. These form a kinetic system composed of autonomous organs which generates energy. By it food is acquired, digested, circulated, and discharged. In contrast to it is a system of control by which external adjustment is wrought. The latter is the central nervous system through whose development life is preserved and activity encouraged. The nerve is not the source of energy, nor does it have any but a subordinate place in the vital organs upon which life depends. We should start, therefore, not with a study of nerves but with an examination of the autonomic system which it controls but does not make. Digestion, circulation, and muscular activity still take place according to methods older than the nervous system. We must shut from view the action of the central nervous system to see what the kinetic system can do and how it does it. Its movements are always of a tropic nature. Heat, light, and gravitation are the first controllers of action, and the type of action is either that of advance or retreat. Next in order is the influence of surplus and deficit. As soon as organisms can store energy they can be aroused to activity by internal stimuli, and with further development these internal states become more effective than the external ones resulting from light and heat.

At a higher level we find organisms with a better developed muscular and circulatory system. Their striking characteristic is the symmetrical development of opposing parts. We can almost say of the higher types that they are two organisms, each side being practically a duplicate of the other. The result is rhythmic action, each part ceasing to act while its opposite discharges its energy. This rhythmic action is not different from the tropic action of simple organisms. It is merely excited in a different way. The animal has lost the control exercised by external agents such as heat and light, and their place is supplied by the states of the blood. When the blood was cold, a mere reflection of external temperature, external forces aroused activity. Now hot blood can stimulate activity and thus energize parts by its presence or check action by its absence. Surplus and deficit thus become the determiners of action. Blood flows to one side, accumulates a surplus and discharges; while it is inactive the other side functions in a like manner. When the central nervous system begins to play its part it alters the flow of blood and checks the rhythmic action characteristic of the kinetic system.

If we judge animals by their behavior, evidence of the existence of a central nervous system is shown in persistent action and in attention. The rhythmic action of the kinetic system is changed into monistic action. Movements are continued even when they are painful. On the other hand, parts with a surplus have their activity checked with a resulting accumulation of surplus which vainly endeavors to discharge itself. The net result of this abnormal situation—parts pained by a deficit and parts overloaded with a repressed surplus—is a better adjustment due to nerve control; but we should not forget the cost in the abnormalities it creates. To this struggle our emotions are due. Consciousness is an attempt of the ultimate life forces to escape domination and not any evolution of their master, the central nervous system. If a break can be made from a lower to a higher realm the dominance of the nerve can be replaced by the dominance of the blood, through which comes a reinstatement of the ultimate life forces in their original position of power. The nerve becomes a servant, not a master. Adjustment yields to the sweep of inborn activities. Our goal is no longer to attain the objective but to voice the subjective.

This seems an impossible task with the tools at hand, yet if we look in the right quarter the road is simplicity itself. The characteristic expression of nerve action is persistence and attention. Measure these in terms of muscle and we have strain. Parts are kept active after their supply of energy is so low as to cause pain. Strain also starts the activity of adjacent muscles by an overflow of energy. Nerve action overdoes itself by exciting more movement than is needed for the desired effect. If we raise the leg we also set the jaw and swing the arm. A series of overflow movements is excited by each nervous strain. Take off the strain and a release of energy follows in the repressed parts. Thus strains and releases are the new alternates, each in turn affecting not one part but many parts. One group of movements is induced by strains and another by the release of suppressed energy which follows the strain.

With these facts as a background the problems of consciousness can be faced. Consciousness is an illumination, a transformation of energy from motion to light. Energy and light have the same antecedents, and from one to the other transformations can be made. Consciousness starts with an overflow of energy due to strain meeting some resistance which intensifies its effect. An electrical current transforms energy into light when it is forced to pass over a slender wire. If we repress bodily energy and let it escape under restricted conditions we produce organically what the electric current does mechanically. This is what strain, repression, and release do if their relation is such as I have described. Nervous control causes an overflow of energy and its repression at other points. The release and escape transform energy into an illumination. Consciousness in its earliest form is thus an overflow of energy due to strain and a release of energy which follows strain. Either of these would produce the desired transformation of muscular energy into light while both together would tend to make the illumination permanent. Such a transformation may be readily observed in the case of fireflies. The movement of the wings is accompanied by the radiation of light. The escape of energy in this case produces an external effect. Change the escaping flow from the body to the brain and an elementary form of consciousness would result.

I want to repeat this thought so essential to my position. Can an energy strain be transformed into a color scale? Is the background of consciousness a change of color and shade, or does a series of ideas flow through consciousness in an immaterial chain? When we repress ideas, do we shove some entity into a subconscious cavern or do we extinguish the color form by which they are recognized? As we decide these questions we determine the form of psychology we accept, and also determine the relative parts which blood and nerve play in the formation of ideas. The problem is: Will a strain produce a mental illumination causing it to be recognized in consciousness not as effort but as form? Do we see something when we strain, and if so, what? My reply would be that blood pulses create the illumination which underlies consciousness and that they are intensified by any strain directing energy into particular channels and repressing it in others. The same localization of energy occurs in the physical background of consciousness as occurs in the strained part of the body. Parts of the field of consciousness are darkened by a deficit of blood and other parts have an increased illumination due to augmented blood pressure. The field of consciousness thus presents a figure which is light or dark, simple or complex, wavy or fixed, as the underlying strains change in their intensity. We thus have a color scale which reflects bodily conditions and through which they may be interpreted.

When in the dark I lie with my eyes closed the changing blood pressure often creates distinct figures. If these slight alterations in pressure are capable of an interpretation it is easy to see how bodily strains can produce more intense effects. Strong contractions in one muscle certainly create an overflow of energy which contracts other muscles. If so, it must derange the circulation in other parts of the body and thus affect the blood pulses of the brain. The rhythmic contraction of related parts causing this condition makes it possible to judge of bodily stresses by the resulting mental picture.

An illumination of this sort would have no adjustive value. It would be merely an escape of surplus energy as is the illumination due to the movement of a firefly. But we should remember that conscious illumination is complex due to the relation of strain and release. It is, therefore, never complete. Some parts of the field of consciousness are illuminated by the release, while other parts are darkened by the strain. Each specific content of consciousness has for this reason a form and these forms are capable of an interpretation. By these forms activity can be judged, and through them we gain the basis of our logical judgments.

The dominance of strain gives one form, the dominance of release gives another. We thus have two forms with every nervous restraint; A as it produces strain, and B in the subsequent release. If the net result of strain and release is organically favorable, we identify A and B and think of the two as interchangeable. A is B and B is A. This is the logical basis of substitution, and it happens wherever A or B are the index of favorable organic effects. But when the effect of strain and release is organically antagonistic we set A and B over against each other and call them opposites. From this tendency we get the basis of our moral judgments. We then pronounce the action which caused the strain to be bad, or we seek to restore harmony by some suppression of the release. In either case we acquire the concept of the good and bad and build emotions which help us gain the good and remove the bad. Love and hate rise in consciousness as soon as antagonism due to strain and release appear. From them comes the concept of free association due to the repeated substitution of similars and the concept of antagonism upon which elimination depends. Hence arise the three elements of conscious thought—illumination, form, and interpretation. With their aid the gap between the physical and the mental can be spanned.

To understand this process we must realize how color and form are interpreted in the ordinary experience of men. The illumination varies from an almost complete field of bright color to a repression leaving only dark lines visible in consciousness. Strain always exerts some influence and thus the illumination is not complete. The nearest to it is the presence of lines or spots in the illuminated field, and then the associated concept is that of a face. The man in the moon is an example of primitive association. Increase the suppression of light, and at the other end of the scale we have wavy lines which are interpreted as snakes and other loathsome creatures. These variations I shall call the chromatic scale. From the resulting combinations all initial interpretations are derived. At the top of the scale, where the illumination is full, the association is with the sun, the creator, the hero, and those concepts out of which arises our ideal of perfection. Less complete, the association is sexual. Any intense figure enclosing dark spots or lines brings to the woman the concept of a man and to the man a like concept of a woman. Still lower on the scale, where the edge becomes wavy, we seem either to be moving through the air and then the bird concept arises, or something comes to take us away, and then we think of a horse. If the illumination is still more obscure we seem unable to move, and the form is that of a bear; while still lower, being conscious only of wavy lines, we are filled with horror at our helplessness and interpret moving objects as hideous reptiles.

These figures in turn arouse tropic movements. An intense light excites a forward movement while a dim light provokes a retreat. The bright we call the good; the dark excites fear; while wavy lines are interpreted as movement. All the primary impulses can thus be excited and an interpretation made in terms of the external world. We read the scale and act on it instead of waiting for the direct action of the external world on our bodily organs. Our movements are excited no longer by heat and cold but by forms projected into consciousness by the chromatic scale. Sense-perceptions are reactions which throw color images into consciousness and then move muscles in harmony with the interpreted forms. Color and form are intermediates between two systems each of which were once independent in their action. It is thus that a few primary impulses get organized so that they perform the functions demanded by a complex adjustment Not a single function is added. The mechanisms of simpler organisms merely show themselves in new combinations.

Such a picture, however satisfactory, does not account for the thought-processes of men as contrasted with their impulsive reactions. There is as great a need of control over visual impulses as over bodily movements. This need the central nervous system supplies by the same means as it controls bodily movements. If persistence is the measure of nervous control of bodily action, attention is its mark in conscious acts. Attention is a mental strain of the same nature as bodily strains. It consists in keeping the flow of thought confined to a single object when, if controlled by impulse, thought would be a series of substitutions. Each thought would then be interpreted in terms of some other thought. This new thought would be put in place of its predecessor, to be displaced in turn by that concept through which it is interpreted. Such a series is a free association, the most familiar form of which is a dream. Attention disturbs this flow of free association and puts in its place the fixed series which we call the logical. To be logical, thought must flow in a fixed groove created by the strain of attention. Grooved thought is the series which leads to survival and hence we call it the truth. True thoughts thus correspond to the flow of objective impressions and lead to the repression of the internal flow of free associations. The believer in truth rejects as false all this internal flow of free associations, shuts it out of his consciousness and builds his scheme of thought only on impressions received from the external world. He does this by means of repressions through which the natural sequence of free association is prevented. There are also groups of compulsions, by which I mean that with given ideas other ideas arise in consciousness and retain a fixed order. These suppressions and compulsions are never complete. The actual thought of man is a combination of antagonistic elements each of which in striving for the mastery forces its opponent into distorted forms. The opposition we cannot prevent, but the bad effects might be obviated by a better understanding of the process by which it is promoted.

This analysis of thought appears strange, but it is not so different from the traditional analysis as at first sight may seem. The fundamental contrast is new, but, when made, the secondary divisions can be readily made to correspond to those now in use. In its origin thought is partly internal and partly external. Internal thought is a process, a constant shifting from one concept to another, the underlying principle being that of substitution. External thought is compulsive. It may fade, but it never changes. When a concept returns it has exactly the same form as before and the same accompaniments. These are impressments if they arise from the action of the senses, or compulsions if they result from strains due to the antecedent action of the nervous system. Impressments and compulsions are unchangeable elements which we can analyze but never transform. They become parts of thought-processes and thus create thought movement only as we substitute for them some concept of internal origin. Through this substitution chains of reasoning are started which flow along a natural channel unless some nervous repression alters their course. Natural thought is a shifting from concept to concept, the new being a substitute for the old. Reasoning of this sort has as premises either impressments or compulsions; then begins a series of substitutions out of which we draw a conclusion. The intermediate steps we may change, but the original premise stands firmly above criticism because it is an impressment or a compulsion and thus beyond the power of conscious thought to alter. When tested by their origins we find that the impressments stand but the compulsions crumble. They are neither a reflection of nature nor a part of our heredity. When they are excluded, thought rests exclusively on sense impressments and on the free associations due to the process of substitution. Impressions are unalterable and uncombinable. The unity we give them comes from no affinity they have for each other, but through the mental compulsions which have their origin in strains. In our free thought-processes impressments enter only through substitutions. They are thus transformed from isolated facts into the mass-formations which free association is capable of making. Attention, which is nervous, analyzes and isolates. Association compounds. These are our only thought-processes; through them thought sinks to mathematical points or rises to mass infinity. The one is the dominant tendency in science; the other gives zest to the flights of the imagination.

Such is the process of thought in its primary terms. To make it correspond to the full consciousness of adult life we must show its application to the combinations of ideas we call memory. As an element in consciousness, memory is a series of associated ideas which differs from free associations in that the order is fixed. Free association is a shifting from one vivid idea to another, the basis of the shifting being the yearning for wish-fulfilment. Memory does not follow this order because the flow of thought is cramped by repressions which force it to move in fixed grooves. Thoughts which hinder adjustment are repressed, while those are intensified which reflect external conditions. Memory is thought moving through or controlled by nervous tracts and reactions. The thought which follows each presented concept is that which excites a nervous reaction and not that which the process of free association would provoke. Memory is thus a series of nervous reactions and not a series of free associations. The nervous reaction is the connecting link between ideas and not the rhythm of blood and muscle which lies back of free associations.

This analysis is readily transformed into the terms of psychology. Writers of long ago discovered that associations were resolvable into three groups, contiguity, similarity, and contrast. This grouping suffices for a mere classification but is no aid in the search for origins. The antecedents of contiguous associations are nervous. The contiguous is that which arises through the nervous reaction which an object excites. Contiguous associations are a series of impressments and not a series of substitutions. Such thought is mechanical but not rational. It is only the two other types of association, similarity and contrast, which are in any true sense associations. They form a process which takes place within consciousness and each is necessary for the other. Substitution acts through the blood and muscular rhythm it excites, and not through the nervous reaction. If we had no related organs which reciprocally act we could have no process of substitution and hence no way of arriving at the thought of similarity and contrast. Association is the interpretation of one object through some other which follows it in the rhythm of activity and replacement. There is a strain, a discharge, and then a rest during which time the activity is transferred to the reciprocal part. Two organs thus take a part in each substitution, the repetition of which creates the series of free associations. We see an object, we think of its name which is its recognition as a sound; then the associated sound is reflected back into the field of vision and there arises in a form related to the sound which was its antecedent. Each series of associated ideas takes a definite path fixed by the associations which arise with each new transfer. Word associations, as the process continues, grow in clearness while visual associations grow more intense. We thus attain a union of clearness and vividness which no process of impressment could attain. The order of these ideas is not that of the external world nor that imposed by the nerves. Free associations move toward a goal set by internal impulse and not toward that imposed by our nervous reactions.

The nerves thus play the same part in thought as they do in bodily control. No one assumes that bodily energy comes from the nerves. It is plainly a rhythmic flow exciting in turn each of two symmetrical parts. Any sudden shock, the stubbing of a toe, a sound, a sight, or the feeling of pain starts a nervous reaction which injects a foreign element in the series and forces action into a new channel. All shocks are injects which disturb rhythmic movement of symmetrical parts. This makes the difference between the rhythmic flow of energy induced by the muscular activity, and the reactions which the nervous system is capable of exciting. These nervous injects are the ultimate premises from which we reason as to ends. The nervous inject is a substitution of a higher value than the thought which its rise suppresses. Let us assume that in a natural series the conclusion is reached that the eating of pork is injurious. If instead of saying this it is affirmed that God prohibits the use of pork, the concept of God is substituted for the evidence about pork-eating. By this means antagonism to pork-eating gains a vividness which the injury of pork-eating could not evoke. This vivid concept of God is a nervous inject which we must explain through some antecedent shock which suppresses the natural flow of thought. All moral laws arise in this way. They substitute nervous shocks of high adjustive value for the crude flow of internal thought. Reality thinking is thus an injection of a nervous reaction as initial point of a new thought-series. When reasoning deductively we say, "It is either A or B." We do not decide in favor of A by means of direct evidence. We say, "It is A because it is not B." It is thus the aversion to B and not the proof of A which determines the decision. The aversion to B is a nervous inject due to antecedent experience. It represents a repression the source of which we may be unconscious of but which has been repeated often enough to be the cause of a nervous reaction. The repressed, however, is not what we hate but what we love. It is a wish, a yearning, reflecting our natural self. But when its presence excites a nervous reaction we substitute for our emotion of love the acuter pain which the nervous reaction evokes. A love is thus changed into a phobia, and the censor instead of being avoided has its power strengthened.

Here is an example from personal experience. I was discussing with a friend the utility of certain beliefs. He was much wrought up at my position and finally expressed his emotion in this form: "If I believed as you do and had only one year to live I would indulge in every sensation that Broadway affords, getting the most possible out of the year." This was put forward as a convincing argument;

but it revealed more of his interior than he was aware. A description of his family will show the content of his inner self. His father was known to have broken every commandment but the eighth, and his brother lived so fast that he died before thirty. His mother was a saintly woman, a lady bountiful who put many an ill-gotten dollar to good use. My friend had an intense love for his mother and accepted all her compulsions as divine commands. His life was as pure as hers, but he had his father's heredity. This was voiced in his denunciation for all his father did, but this denunciation was also an outlet for the pent-up emotions which he inherited but never gratified. It is plain that the intense expressions he used to me were the reflection of his day-dreaming. He would like to be bad but dared not. His expressed thought was thus turned into a form which strengthened the censor instead of thwarting it. The nervous complexes formed in this way lead to superstition through their vagueness and to dogmatism through their cohesion. The purification of thought does not come through them but through free associations. We thus reach the source of mental activity by a route which makes no demand for elements not found in the simple organisms. The blood pulses are strong but fickle. The nerve mechanisms are steady and coordinated. The net result is a series of revolutions due to temporary pulses outwitted by the better organized nerves. Adjustment thus dominates over internal impulses creating an approach to rational conduct.

With this analysis of the elements of consciousness as a basis the new thought can be readily related to older philosophies. The limitations placed on the sensory functions make the part they play in the formation of ideas resemble that given to the sensory powers by the transcendental philosophers. The senses can present; the central nervous system can control; but beyond this neither can go. Some other course must be sought for the processes by which thought can rise to the level we know it is capable of attaining. In so much the transcendentalists were right. They could challenge their opponents' position and win a negative victory. But on the positive side they failed because they sought to find for thought some super-sensory origin instead of looking for a pre-sensory origin. The from-within elements of consciousness are older than the from-without. Life was blind before the rise of the nervous system, but though subordinated its ultimates still persist. The path of progress consists in freeing the elemental life pulses from the distortion which ages of adjustment have imposed. The within must impress itself on the without instead of the without distorting and suppressing what it has not the power to change.

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CRITICISMS AND DISCUSSIONS.

THE PRINCIPLE OF PARSIMONY AND ETHICAL NEUTRALITY.

My object in writing this short note on Professor Laird's extremely interesting paper, published elsewhere in this number, is to deny that certain unpleasant consequences follow from Mr. Russell's acceptance of "Ockham's razor" as the supreme maxim of scientific philosophizing.

Professor Laird believes, for example, that Mr. Russell involves him in a falling away from the "ethical neutrality" he has claimed for his philosophy. For Mr. Russell's entities are not simpler in all respects, writes Professor Laird; and if it be claimed that they are simpler in *important* respects then a subjective standard is introduced. We must here disentangle two separate questions.

1. It may be urged in the first place that Mr. Russell abandons his "supreme maxim" as soon as he accepts a large number of entities—by which, I take it, is meant the *sensibilia* out of which "things" are constructed. Now it does not seem to me that this view could be held if it were once realized what logical atomists are trying to do. Faced by a chair, the atomist—seeking to eliminate all unjustifiable entities—resolves it into a complex of *sensibilia*. He may thereby be led to express in a very intricate manner what is simple to common sense, just as the logistician expresses $2+2=4$ in a garb highly unfamiliar to the beginner in arithmetic. But the atomist is nevertheless in this process strictly adhering to the principle of parsimony in paring away every kind of entity of which he has no direct awareness. The scientist, on the other hand, proceeds in the opposite direction: he multiplies entities unceasingly.

The chair becomes a complex of molecules, which becomes a complex of atoms, which is in turn resolved into a tangle of electrons—and so on. The ultimate goal of this multiplication of entities is the construction of a conceptual scheme which is economically "descriptive" of the increasingly complicated perceptual field opened up by experiment. Professor Laird's argument that the sole aim of science cannot be descriptive because models are widely used, seems to me to miss the whole point about models. For, in the hands of a Maxwell, models are used precisely because they enable those concepts to be formulated between which simple relations hold—those relations having the property that the conceptual scheme so set up expresses the empirical laws in the corresponding perceptual domain. We may conclude, then, that while science is ready, for the purposes of economical description, to multiply entities philosophy seeks to limit such entities (even with loss of economy in statement) to those of which we are directly aware. In other words, the scientific principle of economy *is* anthropomorphic; the principle of parsimony is not.

2. It may now be urged, however, that though Mr. Russell's entities are simpler than those of science, as being all of one type, yet our choice of this system is egocentric. This seems to be what is at the back of Professor Laird's contention. In this he is adopting a similar attitude to that of Dr. Schiller who urges that the principle of parsimony is a maxim of practical convenience. "To a non-human mind," he says, "that was not pressed for time but disposed of all eternity it would be unmeaning or repugnant."[1] This argument depends for its plausibility on the different forms in which the "razor" is expressed. If, however, we express it as *Pluralitas non est ponenda sine necessitatem,* then we merely assert that you must not suppose that more things exist than you have evidence for. The criterion is the appeal to the external world. The standard is therefore not subjective, unless it is assumed that everything, including sense-data, is subjective. Furthermore, from what has been said above it is clear that this is *not* a maxim of "practical convenience." It is, in fact, usually convenient to contravene it. If, for example, we always used Mr. Russell's constructions instead of "things," our novels could only be read by those who disposed of all eternity. And if we avoided the use of the entity "number," Jones minor's text-book of arithmetic would be

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[1] *Mind,* N. S., Vol. XXIV, p. 402.

weightier than Jones minor. In other words, in practical affairs we emphatically do not (and never shall) use the razor to cut away our tables and chairs and numbers and electrons. Ockham's razor is on the contrary an impractical maxim only applied in those moments of critical analysis when we desire to know what errors we are daily committing from pragmatic motives.

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THE LOGICAL SIGNIFICANCE OF "OCKHAM'S RAZOR."

In adopting the principle of parsimony or "Ockham's razor" as the supreme maxim of methodology, Mr. Russell seems to have been guided by esthetic motives. To some of us, indeed, it seems to be more beautiful to start the development of a science in deductive form from three fundamental or "primitive" ideas instead of from four and to define all the rest in terms of these three, and even more beautiful to start from two primitive ideas. But there seems to be a *logical* basis for this preference, for the reduction in the number of primitive ideas implies a discovery of dependence between those ideas at first taken to be indefinable. I shall try to make this more precise.

Formally, the ideas of a deductive science, both the primitive ones and the ones that are defined in terms of them, may be regarded as the "unknowns" in an algebraic problem, between which equations, representing the definitions, subsist. This is at the basis of the algebra of logic. If the number of independent equations is equal to that of the unknowns, the unknowns can be wholly defined. This is the case with the science of arithmetic, according to modern ideas; for number and the other ideas with which arithmetic is concerned are all definable in terms of logic. But if the number of independent equations is less than that of the unknowns, some of the unknowns are indefinable, and in fact it may be more convenient to leave more of the unknowns undefined than are strictly necessary, and preserve the equations between these indefinables. In algebra we may find that, with the unknowns x, y, z, we know that $x=f(z)$ and $z=\phi(y)$, and consequently that y is strictly speaking the only indefinable; but it may be symbolically impossible to *express* x as a function of y. Of course, we may have an indefinite number of defined ideas, and it is easy to see that this number does not affect the question as to how many indefinables there are.

For example, Whitehead and Russell, in their theory of deduction, have expressed *implication* and *joint assertion* of propositions in terms of *negation* and *disjunction*. Sheffer and Nicod have succeeded in defining all the above four ideas in terms of a new function of propositions p and q denoted by "p/q" and which can be defined in the system of Whitehead and Russell as "Either p or q is false." Thus, in the system of Whitehead and Russell we have five ideas of which two are indefinable, while in Sheffer's system we have five ideas of which one is indefinable. The latter is preferable because it discovers a relation between the two undefined ideas of Whitehead and Russell; though this relation does not appear capable, in our system of symbols, of being expressed without making use of Sheffer's indefinable. Thus the principle of parsimony appears, from a logical point of view, to be simply the maxim that logical analysis is to be carried as far as possible; and this is no more than Dedekind's maxim that what *can* be proved *is* to be proved.

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INDEPENDENCE PROOFS AND THE THEORY OF IMPLICATION.

In the January number Mr. Lenzen writes a criticism of the traditional symbolic logic as exemplified by the system of Whitehead and Russell's *Principia Mathematica*. His criticism is that it fails to give a correct theory of mathematical deduction. The attempt is made to prove that, in certain cases, of two mathematically independent postulates one implies the other according to the method of the *Principia*.

The present writer was, at first, in sympathy with the criticism; but finally the error involved was detected. The chief illustration is taken from two independent postulates for algebra:

A2 $(a+b)+c=a+(b+c)$,
M5 $a\times b=b\times a$.

Applying the symbolic methods,

$$M5 \cdot c \cdot A2\,c\,M5.$$

But, says the critic, M5 is true and therefore by the Principle of Inference (any proposition implied by a true proposition is true),

$$A2 \cdot c \cdot M5.$$

The error of the criticism lies in asserting the truth of M5. The Principle of Inference requires M5 to be true universally; Huntington's proof of the independence of A2 and M5 involves, however, finding at least one case or system in which M5 is *not* true and in which A2 is true. Or we may put the matter in another form. If you once assert as true the postulates you are considering, you can no longer investigate their independence; because you cannot find a case in which one is false. On the other hand, if one is false, in some system, it is no longer true universally, and the Principle of Inference used by Mr. Lenzen has no support.

In fact, however, a deductive relation necessitates the use of at least one formal implication, which is a relation between propositional functions. Now it is, perhaps, a fair criticism of the *Principia* that it does not specify the various kinds of variable in terms of which a propositional function may be expressed. It may be a mathematical variable such as x or the shape of a triangle, or it may be a proposition, or it may be a situation or system in which it is asserted. This last view is unfortunately not mentioned by Whitehead and Russell, though the writer believes they would agree with it.

Let us return to the illustration given before. Call the system of algebra corresponding to Huntington's postulate, S_1. A2 and M5 are asserted for the System S_1, and we may call them

$$A(S) \qquad (a+b)+c=a+(b+c),$$
$$M(S) \qquad a\times b=b\times a,$$

both asserted in the system S_1.

By definition $A(S)$ formally implies $M(S)$ only when

$$(S) : A(S) \cdot c \cdot M(S);$$

that is:

$$(S) : \sim A(S) \cdot v \cdot M(S).$$

But Huntington's analysis shows that, for some system, say S_2,

$$A(S_2) \cdot \wedge \cdot \sim M(S_2),$$

or

$$\sim [\sim A(S_2) \cdot v \cdot M(S_2)].$$

That is to say, for this S_2, $A(S_2)$ does not imply $M(S_2)$. The formal implication falls to the ground.

Further on Mr. Lenzen says that a presumption is created that independence applies to propositions as well as to postulates. This presumption is probably an error, for any method of deduction involves the consideration of the particular propositions as special cases of propositional functions. If deductive relations could be found between propositions, these relations would also hold between the corresponding postulates, or else the propositions would not be typical cases. Contrary to Mr. Lenzen's assertion, it is possible sometimes to find deductive relations between particular propositions which correspond to independent postulates, if non-typical cases are chosen. The writer has found several but will choose one for the sake of illustration.

Consider the postulates

$$\text{(A)} \qquad a\,p\,b = b\,p\,a$$

$$\text{(B)} \qquad a\,p\,(b\,p\,c) = (a\,p\,b)\,p\,c$$

These are independent, for if $a\,p\,b$ means $(a+b)/2$, A is true while B is not; if $a\,p\,b$ means a, B is true while A is not; if $a\,p\,b = a\,b$, both are true.

Consider a particular case of B, namely,

$$a\,p\,(b\,p\,a) = (a\,p\,b)\,p\,a.$$

This can be deduced from (A) for

$$\begin{aligned} a\,p\,(b\,p\,a) &= a\,p\,(a\,p\,b) \\ &= (a\,p\,b)\,p\,a, \end{aligned}$$

using A twice.

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CAUSE AND EFFECT.

I.

The latest book by Mr. Bertrand Russell (*Mysticism and Logic, and Other Essays*, London and New York: Longmans, Green and Co., 1918; pp. viii, 234; price 7s. 6d. net) consists of reprints of ten previously (1901-1915) published papers which form a more or less complete whole and to which are added one or two notes written in 1917. The first essay, on "Mysticism and Logic," appeared in so appear go back to Mr. Russell's out-of-print *Principles of Mathematics* of 1903. It seems to me that this essay suffers from the fact that the view that the concept of *cause* can be replaced by the mathematical concept of *function* has been almost a commonplace of science since Mach wrote,—say between 1866 and 1883,—and that Mach's name is not mentioned. The essay is thus summed up (pp. 207-208): "We found first that the law of causality, as usually stated by philosophers, is false, and is not employed in science. We then considered the nature of scientific laws, and found that, instead of stating that one event A is always followed by another event B, they stated functional relations between certain events at certain times, which we called 'determinants,' and other events at earlier or later times or at the same time. We were unable to find any *a priori* category: the existence of scientific laws appeared as a purely empirical fact, not necessarily universal, except in a trivial and scientifically useless form. We found that a system with one set of determinants may very likely have other sets of a quite different kind; that, for example, a mechanically determined system may be teleologically or volitionally determined. Finally we considered the problem of free will: here we found that the reasons for supposing volitions to be determined are strong but not conclusive, and we decided that even if volitions are mechanically determined, that is no reason for denying freedom in the sense revealed by introspection, or for supposing that mechanical events are not determined by volitions. The problem of free will *versus* determinism is therefore, if we were right, mainly illusory, but in part not yet capable of being decisively solved."

Just as in the *Principles,* Mr. Russell considers the case of a swarm of particles in abstract dynamics, where the only thing which, it seems, might correspond to what is called "causality" is the fact that, since the whole path of the swarm is determined by a system of certain ordinary differential equations of the second order, all the arbitrary constants are fixed if we know the configurations of the swarm at any two given times, and thus the configuration at any other instant whatever is uniquely determined by the above differential equations and the above two fixed configurations. Mr. Russell does not state this well-known fact clearly, and thus the uninitiated are left dumb with admiration at what seems mysterious penetration of a very brilliant man. If Mr. Russell had put the matter frankly, he would certainly have committed what would doubtless seem to him a double crime of stating a technical platitude, but still it does not seem that it would have escaped him or others that, in this discussion, the question as to what meaning can be given to "causality" is implicitly limited to swarms whose paths are defined by ordinary differential equations of the second order, so that there are unanalyzed assumptions as to the nature of the functions which give the dependences of the coördinates on the time which are fundamental, and that the grounds for generalization to other physical "swarms" ought to be given.

The logical analysis (pp. 180-192) of what philosophers, according to the definitions they have given, have professed to understand by the word "cause" and allied words is often very amusing. Still this analysis is based on principles which are quite well known to modern logicians; for example, a discussion (such as that on p. 187) of such statements as that the effect follows the cause "immediately" can, of course, quite easily reduce the statement to nonsense by the remark that there are no such things as "consecutive points" in space or time. Then we come to the really important part of the article: "In spite of these difficulties, it must, of course, be admitted that many fairly dependable regularities of sequence occur in daily life. It is these regularities that have suggested the supposed law of causality.... I do not deny that the observation of such regularities, even when they are not without exceptions, is useful in the infancy of a science.... What I deny is that science assumes the existence of invariable uniformities of sequence of this kind, or that it aims at discovering them.... In short, every advance in a science takes us farther away from the crude uniformities which are first observed, into greater differentiation of antecedent and consequent, and into a continually wider circle of antecedents recognized as relevant" (pp. 187-188). Again, "such laws of probable sequence, though useful in daily life and in the infancy of a science, tend to be displaced by quite different laws as soon as a science is successful" (p. 194).[1] Thus, in the motions considered in an advanced science such as gravitational astronomy, "there is nothing that can be called a cause and nothing that can be called an effect; there is merely a formula. Certain differential equations can be found, which hold at every instant for every particle of the system, and which, given the configuration and velocities at one instant, or the configurations at two instants, render the configuration at any other earlier or later instant theoretically calculable. That is to say, the configuration at any instant is a function of that instant and the configurations at two [fixed instants]. This statement holds throughout physics and not only in the special case of gravitation" (p. 194). This, then, brings us back to the point of view of the *Principles*.

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[1] Cf. *Ext. World*, p. 220.

Then Mr. Russell proceeds with the replacement of the old "law of causality" by the idea of a mathematical "function": "No doubt the reason why the old 'law of causality' has so long continued to pervade the books of philosophers is simply that the idea of a function is unfamiliar to most of them, and therefore they seek an unduly simplified statement. There is no question of repetitions of the 'same' cause producing the 'same' effect; it is not in any sameness of causes and effects that the constancy of scientific law consists, but in sameness of relations. And even 'sameness of relations' is too simple a phrase; 'sameness of differential equations' is the only correct phrase" (pp. 194-195).[2] "If the 'law of causality' is to be something actually discoverable in the practice of science, the above proposition has a better right to the name than any 'law of causality' to be found in the books of philosophers.... No one can pretend that the above principle is *a priori* or self-evident or a 'necessity of thought.' Nor is it, in any sense, a premise of science: it is an empirical generalization from a number of laws which are themselves empirical generalizations" (p. 195).

The old "law of causality" is not assumed by science, but "something which we may call the 'uniformity of nature' is assumed, or rather is accepted on inductive grounds. The uniformity of nature does not assert the trivial principle 'same cause, same effect,' but the principle of the permanence of laws. That is to say, when a law exhibiting, e. g., an acceleration as a function of the configuration has been found to hold throughout the observable past, it is expected that it will continue to hold in the future, or that, if it does not itself hold, there is some other law, agreeing with the supposed law as regards the past, which will hold for the future. The ground of this principle is simply the inductive ground that it has been found to be true in very many instances; hence the principle cannot be considered certain, but only probable to a degree which cannot be accurately estimated" (p. 196; cf. p. 192).

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[2] Cf. what seems to be a contradictory statement in *Ext. World*, p. 214.

We will now give a short account of the not dissimilar views previously published by Mach and Karl Pearson.

In papers published in 1865 and 1866, Mach (cf. *Conservation of Energy*, Chicago and London, 1911, pp. 89-90; cf. p. 95; this book is a translation of an important work published by Mach in 1872) maintained that in physics "space" and "time" are merely shorthand symbols used in the representation of the dependence of phenomena on one another. In the work of 1872 just referred to Mach replaced the concept of *cause* by the concept of *function* (cf. *Mechanics*, 3d ed., Chicago and London, 1907, p. 555, and *C. of E.*, p. 9), and also shortly expressed his fundamental standpoint in psychology, physics, and psychophysics (*C. of E.*, pp. 91, 95) as sets of inquiries into the connections among themselves and with each other of (1) our presentations, and (2) our sensations.

According to Mach, the "law of causality" is "the presupposition of the mutual dependence of phenomena" (*C. of E.*, p. 61; cf. p. 102). "The business of physical science is the reconstruction of facts in thought.... The rules which we form for these reconstructions are the laws of nature. In the conviction that such rules are possible lies the law of causality. The law of causality simply asserts that the phenomena of nature are dependent on one another. The special emphasis put on space and time in the expression of the law of causality is unnecessary, since the relations of space and time themselves implicitly express that phenomena are dependent on one another" (*M.*, p. 502). Indeed, "we have grown used to considering natural phenomena as dependent upon one another" (*C. of E.*, p. 59); and, since "temporal" and "spatial" determinations are merely, as indicated above, determinations of phenomena by means of other phenomena, we can eliminate the mention of time and space in Fechner's formulation of the law of causality: "Everywhere and at all times, if the same circumstances occur again, the same consequence occurs again; if not, not" (*ibid.*, pp. 60-61; cf. p. 98). Thus the law of causality is the supposition that between the phenomena $\alpha, \beta, \gamma, \ldots, \omega$ certain equations subsist, the number and form of which are to be found empirically (*ibid.*, pp. 61-62); but we can never discover anything which one would try to express by the phrase "the behavior of the totality of phenomena" (*ibid.*, pp. 62-63). "Let us call the totality of phenomena on which a phenomenon α can be considered as dependent *the cause* [of α]," then α is determined *uniquely* by the cause (*ibid.*, pp. 63-64; cf. *M.*,

p. 502). The principle of "sufficient reason," which was used in mechanics by Archimedes, Poinsot, and others, is, in a paper published in 1868, "only another form of the law of causality" (*ibid.*, p. 81). In 1872, it is the "inverse of" (*ibid.*, p. 65), or is "not essentially different from" (*ibid.*, p. 66) that law (*ibid.*, pp. 65-69; cf. *M.*, p. 502), and is, like that law, barren in default of positive experiences. The principle of excluded perpetual motion is another form of the law of causality: "If a group of phenomena is to become a source of continual work; this means that it shall become a source of continual variation of another group of phenomena. For, by means of the general connection of nature, all phenomena are also connected with mechanical phenomena, and therefore with the performance of work. Every source of continual variation of phenomena is a source of work, and inversely" (*C. of E.*, p. 69). Then some simple consequences of the phenomena $\alpha, \beta, \gamma, \ldots$ being one-valued functions of $x, y, z, \ldots$, were deduced, and the facts emphasized (1) that these theorems do not apply merely to mechanics, and (2) the barrenness of the theorems without experiences (*ibid.*, pp. 69-71; cf. also *M.*, pp. 502-504).

Thus, "the theorem of excluded perpetual motion is merely a special form of the law of causality, which law results immediately from the supposition of the dependence of phenomena on one another—a supposition which precedes every scientific investigation; and which is quite unconnected with the mechanical view of nature, but is consistent with any view if only it retains a strict rule by law" (*C. of E.*, pp. 73-74). This theorem, indeed, is reducible to the purely logical truth that, if $\lambda, \mu, \nu, \ldots$ are one-valued functions of $\alpha, \beta, \gamma, \ldots$, and $\alpha, \beta, \gamma, \ldots$ pass to values $\alpha', \beta', \gamma', \ldots$, so that $\lambda, \mu, \nu, \ldots$ pass into $\lambda', \mu', \nu', \ldots$, then, if the set $\alpha', \beta', \gamma', \ldots$ be brought back to $\alpha, \beta, \gamma, \ldots$, the set $\lambda', \mu', \nu', \ldots$ will return to $\lambda, \mu, \nu, \ldots$ (*M.*, p. 503).

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The views of Karl Pearson are to be found in his book entitled *The Grammar of Science* (2d ed., London, 1900), and seem to have been developed independently of those of Mach. Pearson vigorously protested (cf. pp. 78, 81, 112) against the use of the word "law" when speaking, for example, of gravitation, and suggested the substitution of the word "formula." This is, of course, practically the same thing as the replacement of the notion of *cause* by the conception of *function*. Pearson's work is perhaps better known than that of Mach, but, from the point of view of theory of knowledge, it is very inferior to Mach's work. For instance, the treatment of causality and probability (pp. 128-129, 130) may be mentioned.

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In what follows we will indicate the changes introduced, from 1912 onward, in Mr. Russell's views of the nature of causality,—its dependence on the "principle of induction" and so on. Then we will state some objections, which seem to me to be quite conclusive, to these later views; and finally we will give a sketch of a theory of causality as an *a priori* principle together with a suggested definition of "probability," in so far as it is not merely a way of admitting ignorance as to the validity of certain deductions from completely determined premises,—as when, for example, we say "it is probable that the proposition p implies the proposition q."

According to Mr. Russell (*Principles of Mathematics*, Cambridge, 1903, p. 478), "Causality, generally, is the principle in virtue of which, from a sufficient number of events at a sufficient number of moments, one or more events at one or more known moments can be inferred." This principle, which seems to be the same as the one which, as we have seen, Mach accepted as *a priori*, was founded, in Mr. Russell's *Problems of Philosophy* (first published in 1912, pp. 93-107), on the "principle of induction." Indeed, if we eliminate the reference to time in the manner indicated by Mach, there appears to be complete identity between the above definition of Mr. Russell and the previous definition of Mach. It is, however, convenient to preserve the reference to time when we are considering the abstract science of mathematical physics. We consider an aggregate (which we may call the "space-time" aggregate) of real numbers in four dimensions which forms a numerical image (x, y, z, t) of our physical space and our physical time. This aggregate forms what we may call "absolute" space and time, and is presumably what Newton meant to indicate by certain well-known words of his. With this apparatus of space and time, the positions and motions of physical particles and bodies are represented by functions defined in the aggregate. The aggregate must be numerical if the motions are to be described by differential equations, for the same reasons that, as Mr. Russell pointed out in his *Principles*, the concepts of *differential coefficient* and *integral* imply *numerical* aggregates and not merely any ordered aggregates.

Since an "event" in abstract dynamics is a configuration (*Principles of Mathematics,* p. 486), the principle of induction is simply a problem of extrapolation; if we consider various particular values of an unknown function to be given and which represent various events,—such as the position of the center of a moving sphere as a function of time,—we have to seek a principle in virtue of which we can conclude the values of such a function at other times. It does not affect the nature of the principle if these other times are in the future or the past (cf. *Problems,* p. 101; *Ext. World,* p. 224). Of course, if the functions are quite general in their nature, no such inference can be made; so that if such inferences are to be possible, the functions in question must be of such a nature as to allow inferences from values given to values not given. Now, if a function of t is continuous and the values of the function for a certain infinite aggregate of values of t are known, we can conclude the values of the function at every point which is a limiting point of the t-aggregate, a part of the space-time aggregate just referred to. If the function t is differentiable, the same thing can be done; but if it is analytic, if we know its values for any period of time, however short, the mere knowledge that it is analytic enables us to conclude its value for any other value of t whatever. If, then, we have any reason to suppose that the functions which we assume to lie, as a subject for investigation, at the bottom of natural phenomena are of any special nature, this nature may enable us to give some definite information as to the form in which we can apply induction.

There is a doubtful point about all this: we assumed, in agreement with Mach, that the mathematical physics contemplated depends on functions which are at least theoretically known for all the values of the time; but it might seem that we can only know that nature is governed by law at all times by an application of the inductive principle (cf. *Problems,* pp. 98-103, 107). This objection was urged against me in a conversation of 1912 or 1913 with Mr. Russell, when I tried to explain the point of view of investigating the foundations of mathematical physics by determining the natures of the various functions used (cf. my notes in Mach's *C. of E.,* pp. 99-101). But it seems to me that there are two reasons against regarding induction as more fundamental than causality.

1. In the first place, mathematicians have become accustomed, at any rate since the times of Dirichlet, to regard the word "func-

tion" as meaning a correspondence between two aggregates (variables) even when the correspondence cannot be expressed by any known law. Thus, when we say that, for example, x is a function of t, we do not imply that, when t is fixed in value, the corresponding value of x can be calculated by a formula which expresses the law of correspondence: indeed, it can be established by simple arguments of which forms were used by Cantor as early as 1873, myself in 1903 and later, and Mr. Russell in *The Monist* for January, 1914, that there are functions in the general sense which cannot be represented as limits of infinite series of continuous functions. The importance of such reflections in this connection is that, when we say that x is a function of t, we do not imply that there is a formula correlating x and t; and that consequently we do not assume that x "depends" on t in the sense in which we would say that x "is given in terms of" t by a formula or "law of nature." It might be urged that such a function would be incapable of definition, but this would be a mistake, as is clearly shown by Cantor's method (1892) of defining uniquely a one-valued function which must necessarily be omitted from any one-one correlation of the arguments of this function with the class of one-valued functions possible for the same arguments, or by a simple application of my recent proof that any aggregate whatever can be well-ordered. It seems that Mr. Russell has been misled by his refusal to give ear to the teaching of the history of mathematics, and has paid the penalty of this refusal by repeating unconsciously the reasons which led D'Alembert, in the latter half of the eighteenth century, to maintain that the "arbitrary" functions which appear in solutions of certain partial differential equations obey the "analytic" law of being determined for the whole range of their arguments by the values for a small range of these arguments. In fact, in his formulation of the law of universal causation, Mr. Russell proceeds as follows (*Ext. World*, p. 221; cf. p. 219): "There are such invariable relations between different events at the same or different times that, given the state of the whole universe throughout any finite time, however short, every previous and subsequent event can theoretically be determined as a function of the given events during that time." That there is here an assumption that such relations are what Weierstrass understood by the words "analytic functions" can be proved quite simply by showing that we cannot,—excluding for obvious reasons the "monogenic" functions of Borel,—reduce the states at all times from the states during some interval of time when the function is not analytic. Suppose the state were known to be constant throughout the finite space of time from a to b, including the ends: if the function were analytic, we could conclude that the state was constant throughout all time; but this need by no means be the case if the function were merely continuous or, say, merely differentiable.

2. I now come to the objection to founding causality, through the "principle of induction," on the notion of probability. The world of mathematical physics,—or at least one of such worlds,—is a schematic representation of reality, in which all causes which are not predominating ones are left out of account and treated, for the sake of saving the trouble of attending to many things whose influence is very small, by the calculus of probabilities. Thus, this calculus studies effects about the causes of which we are ignorant; and the usual (Laplace's) definition of "probability" implicitly contains a reference to an assumed non-existence of a predominating cause (cf. S. Pincherle, *Scientia*, Vol. XIX, 1916, pp. 417-426; cf. my account in *Mind*, N. S., Vol. XXVI, 1917, pp. 243-244). It seems, then, that it is when we try to decide, without making use of the notion of cause, which—if any—is the most probable of various configurations at time t' of a physical system that we meet those "terrible difficulties in the notion of probability" spoken of by Mr. Russell (*Ext. World*, p. 36). And, as an attempt to define causality in terms of probability is an attempt to walk in a vicious circle, we can hardly avail ourselves of the permission Mr. Russell went on to give, "—but we may ignore them for the present."

Let us try to make clear to ourselves what sort of questions we have to deal with in the calculus of probabilities. First of all, we may put on one side all assertions about the "probability" or otherwise of a known *proposition* q being implied by a known *proposition* p, the actual deduction not having been made, and confine discussions about "probability" to certain discussions about the truth-value of propositional *functions*. Now, although we may speak, say, of "the probability that $\phi(x)$ is true," where we know the form ϕ, the range of x, and the truth-value of $\phi(x)$ for any x in the range (it is m/n, where n is the number of x's in the range and m is the number of those x's for which $\phi(x)$ is true), it is not difficult to see that the characteristic questions arise only when one or more of the arguments are *unknown* coordinates of space or time. Questions in probability are thus essentially questions in physics.

But it is a simple deduction from a known physical law that, of all paths which might be described by a system of known constitution (iron, brass,...) and connections under any forces (gravitational, magnetic,...), that path which is described by the system if it is a purely dynamical one (the given *masses* are relevant and not their constitution, such forces as that of gravitation are alone admitted, and "concealed" masses not assumed) is that determined by the rules of the calculus of probabilities to be the "most probable" one. In fact, Gauss observed at the end of the memoir (1829) in which he announced a new form of the fundamental law determining the motion of any dynamical system whatever: "It is very remarkable that the free motions [of the particles of the system under the given forces], if they cannot take place owing to the conditions of the system, are modified by nature in precisely the same manner in which the calculator compensates, according to the method of least squares, experiences (*Erfahrungen ausgleicht*) which relate to magnitudes connected of necessity with one another. This analogy can be still further followed out, but to do so is not my intention at present" (cf. the reprint of the original in No. 167 of *Ostwald's Klassiker*, p. 30, and my notes on pp. 46-47, 68; cf. also Mach, *M.*, pp. 350-364). This Gaussian "law of least constraint" determines uniquely the motion of the system when the mechanical forces, masses, connection, and initial conditions are known; and it seems that we may define "most probable" as "mechanically determinable." Everybody will at once recall such facts as our greater familiarity with those events which are of a predominantly mechanical nature; the surprise occasioned in us by a physical experiment, such as Oersted's, from which results a motion which cannot, without going beyond the sense-data, be explained mechanically (cf. Mach, *C. of E.*, p. 69); and that the law of the arithmetical mean for averages is a consequence of the law of least squares.

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We will now consider the law of causality as an *a priori* principle.

In all natural science our aim is to complete facts in thought—whether for practical or purely intellectual ends or both. For this purpose we set up a model—a mathematical construction in thought, and so arrange that the logical consequences of premises in our model should represent—approximately at least—the events which have very frequently followed certain other events in nature, while there are other consequences which represent what might be unobserved events. Thus our model might contain Galileo's formula ($\frac{1}{2}gt^2$) for falling bodies, which would give results for times, say in the next century, at which no observations have been made. We then presuppose that it is possible to complete facts in thought; if this supposition were not true, it would obviously be impossible to have any science at all, but only mere descriptions of isolated observations. The case is something like the case of the solution of differential equations in mathematics: solutions of certain more or less isolated kinds of differential equations have been known for over 230 years, but it was less than a hundred years ago that Cauchy showed that, logically speaking, the first question was to prove, in very general cases, the existence of solutions. He did this for many cases. Now, in physics we cannot prove logically the existence of events corresponding to our above-mentioned conclusions, as we could if physics were founded exclusively on logic; and consequently, from a logical point of view, we must *assume a priori* this existence *unless* we find it possible and desirable to deduce propositions from our model without any reason whatever for believing or disbelieving that they represent completions of facts. This last process is analogous to the practice, if it has ever been practised, of setting up functions which may be solutions of differential equations although we have no *a priori* reason for thinking so and no kind of assurance beforehand that solutions exist. It is under the assumption that we must know that it is possible to complete facts in thought that Mr. Russell (*Ext. World,* p. 223) says that "there must necessarily be some *a priori* principle involved in inference from the existence of one thing to that of another"; but he chooses, on the grounds that the formulation of the law of causality is complicated and its assumption *a priori* is therefore unplausible (*ibid.,* pp. 35, 223; cf. *Myst. and Logic,* p. 195), that the "principle of induction" is more fundamental. He rightly remarks (*Ext. World,* p. 36) that Mill's "method of simple enumeration" does not invariably give true results, and therefore discovers a way of saying something involving the method of simple enumeration that is invariably true,—its "probability" increases indefinitely with the number of instances. Apart from the introduction of an indefinable,—"probability,"—in a way that seems to appeal to popular rather than scientific minds, this has the same meaning as: "The propositional function $\phi(x)$ is not true for all x's, but the propositional function 'for every x either $\phi(x)$ or not-$\phi(x)$' is invariably true."

The principle of causality may, it seems to me, be stated without any use of an indefinable "probability" as follows:

There is a one-one correspondence between any portion of the universe and the whole of the universe such that any change in the portion necessarily implies some change of all the rest. Of course it must be added that most of these changes are quite imperceptible to ordinary observation: what is meant is that, speaking with the utmost strictness, nothing in the world can change without everything else also changing. Imagine a person jumping on the surface of the earth: common sense would say at once that it is absurd to say that the jumper moves the whole earth. But if we consider the case of two gravitating masses m and n, of which m is very great and n is very small and in contact with m; and n is alive and jumps a short distance from the surface of m; then the common center of gravity of m and n remains fixed, and consequently the whole mass m moves a very minute distance. Such instances take away the appearance of paradox in the principle of causality just formulated; and we must always remember that, for practical purposes all very minute alterations may be disregarded. Thus, although strictly speaking the correspondence between the variations in any portion and the whole is one-one, for practical purposes we can regard the correspondence as many-one and say that changes may possibly take place without any (perceptible) alteration in most other things. This comes to the same thing as pointing out that these are "practically isolated systems" (cf., e. g., *Myst. and Logic*, pp. 197-198; *Ext. World*, p. 226). In the account given by Mach of the functional dependences of changes in any portion of nature or changes outside, these functions were, since Mach never concerned himself with mathematical refinements, many-one, and consequently he was forced to admit that there are, as there appear to be, cases (of which an example was given in *M.*, p. 503) in which a certain phenomenon B can vary without a corresponding variation of the phenomenon A, although to different A's correspond different B's. It is to be noticed that Mach rejected, as everybody concerned with practical work does reject, the notion of a change determining a change of the *whole* universe.

It is to be remarked that Mach expressed himself very strongly as to the absence of meaning in such a phrase as "the state of the universe." At least he did this in his publication of 1872 (*C. of E.*, pp. 62-63),—but he did not repeat his objections in his *Mechanics.* This may have been due, either to his supposition that the correlation between changes in a portion and in the whole is many-one, or to his definition (*C. of E.*, p. 63; *M.*, p. 502) of "the cause" of A as the *totality* of sense-data which condition the existence of A, and he may have suspected that such a cause may involve the whole universe. But it seems that we might speak of a propositional function involving x, where x is *anything* in the universe, without speaking of the universe as a subject of the propositional function. Further, it seems true that we cannot speak of a space and time which have existences apart from the universe itself; for "space" and "time" seem to be merely convenient ways of describing the relations of the universe to any particular event. But, in our mathematical schemes of the world, we introduce absolute space and time, and, though we might seem to be able to consider the universe in absolute space and time, we find on closer consideration that our schemes are merely approximations to a representation of a portion of the universe which is a practically isolated system. The contrast between the absolute space and time of mathematical physics and the relative space and time of physics will be more fully developed on another occasion; here we are only concerned with the facts that strictly speaking the cause of any effect is the whole universe; and, on the other hand, that it is always possible—often it would seem very simple—to regard for practical purposes physical systems in a small portion of the universe as isolated. It is not asserted that there is an *a priori* principle of causality: all that is asserted is that, *if* there are "laws of nature," they are *a priori*, for it is, in general, logically impossible to determine a law from a finite number of observations,[3] and "probability," even if it could—which would seem doubtful—serve to bridge the gap between observation and law, cannot, without a vicious circle, be used to define "causality," but can itself be defined by means of a certain causal law. Though we may have to assume that there are "laws of nature," we cannot really prove, except by some further hypothesis, that, for instance, the "law of gravitation" is such a "law."

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[3] If we knew somehow that the law is an *algebraic* function, this would be possible; if it is not, an infinity of observations would always be necessary.

II.

Dr. Charles A. Mercier (*On Causation, with a Chapter on Belief*, London: Samuel George, 52a High Holborn, W. C. 1; price 7s. 6d.; pp. xii, 228) has published a book in which he attempts an investigation into the problems of causality and belief. In the first part of the book, Dr. Mercier deals critically with various theories of causality. In the second part, he expounds his own views concurrently with criticizing Mill's views. In the last part of the book the fascinating subject of the nature of belief is dealt with.

In the course of his criticisms, Dr. Mercier gives short and therefore necessarily inadequate accounts of the views of Hume, Mr. Welton, Prof. Karl Pearson, Mr. Bertrand Russell, and Dr. Mac Taggart. Sympathetic understanding seems to be the basis of all really valuable criticism. It is lack of this sympathetic understanding that makes so much of the criticism in this volume disappointing. Particularly in the treatment of Mr. Russell's theory of cause is this defect plain. The outcome (p. 34) of the critical examination of the theories is interesting and must be quoted:

"In conclusion, it is suggested that the inability of philosophers to define causation in consistent and intelligible terms argues, not that causation is imaginary, but that philosophers are incompetent."

It may be worth while to examine more closely Dr. Mercier's criticism of the theory of causality put forward by Mr. Russell. Mr. Russell has carried his discussion of causality farther than most philosophers, and has stated clearly various difficulties in the traditional formulation of the principle. Thus, for example, in the article "On the Notion of Cause" (*Mysticism and Logic, and Other Essays*, London, 1918), the question of the time-interval between cause and effect is discussed. It is explained that cause and effect cannot be contiguous, for "no two instants are contiguous, since the time-series is compact." Mr. Russell has defined on various occasions what he means by "compactness" (cf. *The Principles of Mathematics*, London, 1903, p. 271, and *Our Knowledge of the External World*, Chicago and London, 1914, p. 132). A series of terms is "compact" when no two terms are consecutive. Contiguous terms are consecutive. Thus it is not correct to say, as Dr. Mercier says (p. 25), "the more compact the time-series, the more closely contiguous must be its instants." It is interesting to see an example here of the kind of alteration the modern philosophical point of view, which is based on logic, has made in the treatment of certain problems. With the technical apparatus of modern logic, it has been found possible to offer an analysis of the nature of such a series as the time-series appears to be. With this analysis, a further discussion of the problems of the time-relation between cause and effect can be given, and the difficulty of allowing that cause and effect are contiguous in time, or are separated by a finite interval in time, has been made clear. For it can only be urged that cause and effect are contiguous in time if it is assumed that the time-series is discrete and therefore discontinuous, and this very few thinkers appear to assume. On the other hand, if there is a finite interval between the cause and the effect, there is always the possibility of something happening during the interval to prevent the expected result. Thus, when I put a penny in the slot, an earthquake may ensue before I can get out my ticket, and thus putting the penny in the slot is not, by itself, adequate to ensure the effect. All this discussion Dr. Mercier sets aside as (p. 26) "having no relation whatever to causation, as it is known on this earth." But people do put pennies in slots, and things might happen to prevent the tickets coming out.

It is to be remarked that Dr. Mercier himself has not seen the difficulty in question, for in talking of a man pushing a trolley (p. 26), he says that "the effect begins as soon or almost as soon as the cause begins." Here is the very difficulty which Mr. Russell is discussing. And thus, Dr. Mercier not only does not dispose of Mr. Russell's contentions by calling them (p. 26) "pretty word-spinning," but actually, on the same page, introduces the identical difficulty without noticing that it *is* a difficulty, and therefore of course without discussing it. Dr. Mercier quotes Mr. Russell's statement of the principle of causality, and says (p. 27) that "by no perversity of ingenuity" could anything which can be discovered by means of it "be twisted or tortured into a cause." But in Mr. Russell's view (*Mysticism and Logic*, p. 180), "the word cause is so inextricably bound up with misleading associations as to make its complete extrusion from the philosophical vocabulary desirable." It is therefore scarcely to be expected that his statement of the principle would give us a way of discovering the cause of anything. Mr. Russell is engaged in formulating a principle which shall be a principle of causality in virtue of its fulfilling the condition of being a principle by means of which "from a sufficient number of events, at a sufficient number of moments, one or more events at one or more moments can be inferred" (*Principles of Math.*, p. 478). In saying (p. 27) that "it is clear that no cause of any thing ever has been discovered or ever can be discovered, for we can never know the state of the whole universe," Dr. Mercier seems to be overlooking Mr. Russell's remark (*Mysticism and Logic*, p. 187) that "it must, of course, be admitted that many fairly dependable regularities of sequence occur in daily life" and (p. 192) "we may admit that, if any such sequence has been observed in a great many cases, and has never been found to fail, there is an inductive probability that it will be found to hold in future cases." This allows the possibility of our being able, with some degree of assurance, to detect casual sequences.

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In Chapter II the constructive part of the work is begun and the relation involved in causation is examined. The following definition is reached (p. 47): "A cause is an action or cessation of action connected with a sequent change or accompanying unchange in the thing acted on." An "unchange" (p. 48) is an effect "which impresses us as....the prevention of change." In Chapter III there is a discussion of condition, and in Chapter IV an examination of (p. 77) "the five characters or marks that are said to be characteristic of causation, viz., equality of cause and effect, immediacy, unconditionality, invariability, and antecedence": which "shows that not one of them properly or necessarily pertains to causation." The definition of causation is modified and finally stands as (p. 77) "the necessary connection between an action and the sequent change or accompanying unchange in the thing acted on." In the next chapter the doctrine of Plurality of Causes is attacked and Mill's work on it reinterpreted. For the Law of the Uniformity of Nature, Dr. Mercier proposes to substitute an "Axiom of Causality" (p. 101): "Like causes in like conditions produce like effects, and the more closely alike the causes and the conditions, the more closely alike will be the effects." In Chapter VI, twelve methods of ascertaining causes are given. These methods (p. 146), "used by scientific men in scientific matter, are precisely the same as those used by every one else in the common affairs of daily life." Finally a list of the three things which it is necessary to establish in order to prove causation are given (p. 165):

1. Action on the thing on which the effect is produced;

2. Precedence of the action on the change, or accompaniment of the action with the unchange;

3. Connection between the action and the effect, and a list of common "blunders" is added.

Chapter VIII, which deals with the causes of death and the causes of insanity, is absorbing and original and provides interesting examples of Dr. Mercier's methods of inquiry.

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The last part of the book deals with belief. Now, in elaborating a theory of belief, it is essential first to find as many propositions about it which are obviously true as one can. Dr. Mercier does not get to any definite theory of belief, but he points out many interesting things about it which are relevant, and must necessarily be taken into account if a satisfactory theory is to be established. It is, therefore, in this preparatory stage of the work of solving the problem of belief that Dr. Mercier's contribution is most helpful.

It is pointed out that there is an ambiguity in the use of the term belief, that it may mean "being convinced of" or "being sure of"—as, for example, in "I believe there is a God" and "I believe it will keep fine." It is, of course, the latter usage, in which believing and knowing can be contrasted, that it is interesting to analyze, and it is this concept which Dr. Mercier proceeds to discuss. Belief, Dr. Mercier suggests, is an attitude of mind toward a fact or toward a statement about a fact. This statement would be more interesting if the view adopted as to the concept of mind were explained. To say that belief is an attitude toward a fact or toward a statement about a fact seems to mean that an act which is a believing that *a* is to the left of *b* is of the form:

x has a certain relation to (a being to the left of b), or

x has a certain relation to S (a being to the left of b) where

S (a being to the left of b) is a statement about (a being to the left of b).

Now there are false beliefs. If this particular belief is false, *a* will not, in fact, be to the left of *b* and so there will be no fact which can be described by "*a* being to the left of *b*." This difficulty Dr. Mercier clearly feels and it is because of it that an alternative of a relation to a statement about the fact is given. But the interesting point, under these circumstances, is to analyze what can be meant by a statement about a non-existent.

Dr. Mercier next points out the relational character of facts.

He is careful to mention that there are many relations which can subsist between terms, since, he says (p. 192), "the teaching of every book on logic is that there is only one relation between things, and that there is only one verb in any language, namely, the verb 'to be.'" But with this statement as to the teaching of "every book on logic," every student of modern logic is bound to quarrel. The doctrine that there is only one relation which can subsist between terms is certainly (p. 192) "a curious superstition, and well worthy the attention of students of irrational beliefs." The falseness of this doctrine has, of course, been generally recognized by modern logicians, but it is perhaps worth while pointing it out again. But it is a curious mistake on the part of Dr. Mercier to imagine he is making a discovery in pointing out that it is false. The point as to the relational character of facts is again a familiar one to all except those who are entirely ignorant of modern logic,—but the suggestion as it stands is too narrow. It is stated (p. 192) that "our expression of a fact is always in the form 'A is related to B,' and this empty form is filled out and vitalized by substituting appropriate terms for A and B, and by interposing between them a verb as a connecting link, as for instance, 'Hens lay eggs.' This is an expression of a fact, and the fact is expressed by asserting a relation of laying, which means...parentage, between the eggs and the hens." Now we cannot accept this very simple interpretation of the form of the fact "Hens lay eggs," and it seems not extravagant to suppose that there are facts not expressible in the form:

A is related to B.

Thus, in geometry, we have such facts as:

A is between B and C.

Such a fact is relational, but the relation subsists between three terms. It is needless to multiply instances, but modern logic has not at present been shown to be wrong in its theory of the existence of relations between more than two terms. Dr. Mercier's assertions cut out immediately any such theory. By his dictum on p. 217: "Whoso makes an assertion, upon him lies the burden of proof" (if there is anything in such a principle, which seems doubtful), it is for him to prove that all facts are of the dual relational form. Such an assertion most definitely contradicts the views of the modern logician and must be challenged.

In considering various beliefs, Dr. Mercier points out that some statements are not merely false, but definitely nonsensical and such that the mind will not even consider them. Such are, for example, "Two o'clock is solid," "Limestone reasons downward." That beliefs are never nonsensical is an important, if obvious point to be remembered in constructing a theory of belief. The notion of nonsensical as employed by Dr. Mercier is, of course, the same notion as that of "non-significant" which is used in modern logic.

But there are also beliefs which, though not nonsensical, are instantly rejected by the mind. This class are clearly those which contradict the laws of logic. The examples given, "The hen laid an egg larger than itself," "The solid body is liquid," at once contradict definite logical propositions.

Dr. Mercier asserts in the course of his discussion (p. 227) that "belief ought to conform to fact, but cannot be directly related to fact, for we have no direct knowledge of fact. Between belief and fact there is always the intermediary of evidence." Evidence, it appears, is of three kinds—evidence of sense, evidence of reason, evidence of hearsay. Now (p. 193) "when we have an impression on a sense, when we see a light, hear a sound, or feel a touch, these are facts of ultimate certainty; and it is not open to us to doubt that we do experience the sensation." But, in allowing that we cannot doubt that we have certain sensations, is not Dr. Mercier contradicting his previous assertion that we have no direct knowledge of fact? "A fact" (p. 225) means "anything existing or happening in the past, present, or future." Thus the having of a sensation is clearly a fact, and one which we cannot doubt. Further, how will Dr. Mercier treat our knowledge of the truth of logic? Some of our beliefs in logical proposition are not based on anything. Our knowledge of the law of contradiction is, probably, direct. Anyhow our knowledge of some of the propositions of logic is direct.

In his treatment of "empirical certainty," Dr. Mercier makes some assertions which seem to be difficult to justify. He states (p. 227): "That relation which has been found constant....in experiences diverse and incalculably numerous, is true for us." Further (p. 228), "If the relation is not constant in experience, then the degree of belief ought to correspond with the proportion that the positive instances in experience of the relation bear to the negative instances in which the terms of the relation occur apart." But on p. 207 another suggestion is made. We have as before: "If these experiences are sufficiently numerous, and are all one way, we must believe that the experience is necessary, and will continue...." But also: "When experiences are not constant....we are compelled to believe that a similar proportion will hold of such experiences in the future." This is a different proposition from the other. Neither as it stands is satisfactory. They employ words involving all kinds of difficult points (e. g., "sufficiently numerous," "necessary"). The immense difficulties and subtleties of the problem are not even mentioned. It would be almost impossible to deal satisfactorily with all the vital questions which are involved in the small space left to Dr. Mercier for this discussion, but we venture to think that the treatment of the subject suffers from the absence of any hint as to the view taken of probability. The relation of probability to induction seems one of the most baffling problems. Its position is fundamental in any inquiry such as Dr. Mercier's.

* * *

Dr. Mercier's treatise is throughout fresh in its treatment and keen and practical in its point of view. The taunts at philosophers and logicians, though they occur so very many times that one tires of their biting humor and sharp wit, are not essential to the book. One cannot help feeling that a more intimate acquaintance with the work of the modern logicians would cause Dr. Mercier to modify his opinions and change his exceedingly ungracious attitude to philosophers and thinkers generally, which he takes every opportunity of expressing in the present work.

DOROTHY WRINCH.

LONDON, ENGLAND.

III.

Miss Wrinch quotes me as formulating an "Axiom of Causality," a thing I have never done, and should never think of doing, for if causality means something different from causation, I do not know what it means, and if it means the same, I object to calling the same thing by two names, and thus introducing confusion and preparing the way for a fallacy of bivocation.

For the rest, it would be profitless for me to follow Miss Wrinch point by point; for the difference between us is fundamental, and no discussion could diminish it. She regards causation, or causality, as she prefers to call it, from the standpoint of philosophy, as a matter of words, or at the utmost of thoughts, for philosophers to wrangle over. I look upon it from the standpoint of science, as a matter of actual occurrences in the world of experience, occurrences whose nature is to be explained, whose occurrence is to be investigated, identified, and accounted for. I assume that is a thing or event that actually happens in the world of experience. Miss Wrinch follows Professor Pearson and Mr. Bertrand Russell in assuming that it is a word that can be banished from philosophical discussion, and will then cease to exist. There can be no reconciliation between these two attitudes of mind—I apologize for this expression, which Miss Wrinch objects to but which will, I think, be generally understood. If I were to traverse her criticisms, I should be belaboring what seems to me to be shadows, and entering upon a profitless verbal wrangle. I trust Miss Wrinch will not think me discourteous if I say that, living as I do in a world of realities, I have something better to do.

CHAS. MERCIER.

PARKSTONE, ENGLAND.

IV.

I would like to add a little to Dr. Mercier's reply to my criticism. But, first, I must apologize for calling his "Axiom of Causation" an "Axiom of Causality" by mistake.

It is a surprise to me that Dr. Mercier thinks that the difference between his attitude and mine is fundamental. My attitude was merely that of impartial inquiry. When he criticizes the work of great thinkers in a way which seems to me to miss all the important points, it is, I feel, time to lodge a protest. But I am at a loss to understand how this can enable Dr. Mercier to deduce anything about my own opinions—or how they are relevant to the discussion. If my view is of any interest to him—and I could never have guessed that it would be—I may say that the questions which Mr. Russell has discussed in his work on causation do not seem to me to be shadowy, neither do they seem to me to turn on verbal points.

All the criticisms which I have made remain unanswered. In particular it is to be regretted that Dr. Mercier has not seen fit to deal with the points I brought up in connection with modern logical theory, which seems to me to be of vital importance in such subjects as causation and belief. A general and wholesale condemnation of philosophers seems hardly the best way to meet criticism.

DOROTHY WRINCH.

LONDON, ENGLAND.

CURRENT PERIODICALS.

In *Scientia* for January, 1919, the article on Greek influence in the development of Hindu mathematics, by G. R. Kaye, may not unlikely be a grievance against the oppressor, in that it displaces a lustrous jewel in the crown of Hindu culture. It challenges the hitherto undisputed dictum that with no aid, or with little outside aid at all, the inhabitants of the great peninsula attained considerable distinction as exponents of mathematical science. Kaye now congratulates mathematical historians on the scepticism with which they have regarded these assertions. He is cruel enough to present claims and conclusions in the simple forms: the Hindus invented our notation (probably untrue); and became the greatest calculators of antiquity (does not entirely agree with the facts); as certain propositions are for the first time met with in Hindu works, therefore the Hindus must have discovered them (pure romance). The author examines one by one the partisans of the Hindu view, demolishes or modifies most of their assertions, and then proceeds along lines of his own choice. He finds every proposition in the Hindu works of a period in the same or slightly varying form in the works of the Greeks, and nowhere in the oldest Hindu literature. The ancient Hindu mathematicians themselves are shown to have looked down with scorn on their predecessors. Brahmagupta, for instance, claims no originality and even indicates his sources of information. Kaye seems to have hopes that some day or other we shall discover a copy of the lost works of Diophantus, or of Hypatia. The matter will then be at rest.—Sir Oliver Lodge takes "Ether and Matter" once more as his subject. He traces the steps by which electricity came ultimately to be considered as the raw material out of which matter is composed, how the material atoms may be explained with the help of electrons, how electric charges are composed of modified ether, how we may regard all kinetic energy as belonging to matter whether atomic or corpuscular, and all static energy to the unmodified and universal ether. Coexistence and interaction form the fundamental joint quality of matter and ether. "The potentiality of interaction, and often the conspicuous reality of it, everywhere prevails and constitutes the whole of our purely mundane experience."—G. Levi takes as his topic the life of the isolated elements of the organism. He describes the work of Harrison, Born, Giardina, W. and M. Lewis, and congratulates morphology on its possession of a new technique. "For the first time we are able to analyze the structure of the living protoplasm of higher organisms, to follow its transformations, and to determine the behavior of protoplasm under artificial stimuli." He believes that the culture methods of investigation will have a decisive influence upon the future of investigations upon the structure of cells and tissues.—P. Bellezza's note on the phonology of the wider Rome, of Romania, explains how it is proposed to trace the determining causes of the evolution products of the transformation of the Latin tongue in the various countries through which it spread and exercised its potent influence. For this purpose it is necessary to summon to our aid the assistance of more than one science of which the older grammarians and etymologists had never heard or dreamed. The laws of phonology have their physiological basis. Phonetic phenomena are produced and remain identical as long as the conditions remain unchanged. The absolute uniformity of such laws continues until some psychic element intervenes, such as is afforded by contact with races speaking other tongues. This brings us to the "dead point" of phonetic laws. By the combined aid of physiology, ethnology, geography, and history, it is hoped that considerable light will be thrown upon questions that have perplexed generations of students of linguistics.

In *Scientia* for February, 1919, José M. Plans writes on the introduction of the method of perturbations into general mechanics. Work in this direction is associated with the names of Kobb, Moulton, and Behrens. He indicates how in a limited number of cases the classical method of celestial mechanics may be applied to general mechanics.—Alexandre Moret writes on Egyptian hieroglyphics, a subject which has enthralled many men of his race from the days of Champollion.—E. Claparède discusses the new educational principles which are to transform our schools. The old system under which the social instincts were suppressed is doomed: we are to have democratic institutions in which internal discipline takes the place of a discipline imposed from without, the key-note being "self-government." We shall have no teachers who are not psychologists, and when we say that the children of the future are to do nothing but what they like, perhaps it should be paraphrased into: they will do with all their heart what they are at because they will want to do it.

In *Scientia* for March, 1919, we are reminded that J. L. E. Dreyer has a prescriptive right to the handling of any new material concerning Tycho Brahe. His article on the place of the famous astronomer in the history of his science is no doubt suggested by a discovery made in the course of preparing a new and complete edition of the manuscript books of Tycho's nightly observations. The discovery refers to what has always been "an extraordinary riddle." What the puzzle is may be found in the article, to which we refer the reader.—Luigi de Marchi describes the various methods, deduced from general principles, which are used for representing the surface of the earth. The various types of projections are carefully explained and their relative values indicated. From these he passes to those types which combine the merits of two or more of the normal types, and involve the use of artifices and constructive adaptation, e. g., "polyconical projections, on one of which is constructed the English War Office map."—Ingvar Jörgenson and W. Stiles discuss the present condition of the problem of the assimilation of carbon—a matter, they claim, of general interest to humanity, seeing how the solution must affect human needs, from the point of view of plant physiology and, when the time comes, from its connection with the utilization of the radiant energy of the sun. A careful account is given of recent research on the subject, and as the general outcome of their critical examination of existing claims they conclude that there is still "a very long row to hoe" before success can be said to be in sight.—L. Houllevigue discusses the future of pure science. In his own country he foresees that money, men, and methods, all of which are essential for the future of pure science, will go to the development of the industries. He has no panacea to offer, but he closes his pessimistic outlook with a call for money enough to keep body and soul together in those engaged in pure research, for a careful selection of the right men to carry on the good work, and for the systematic organization of the work of the future.—R. Assagioli calls the attention of European psychologists and alienists to the work of Morton Prince and Boris Sidis, and to the discussions between them and the disciples of Freud, which have appeared in the *Journal of Abnormal Psychology* and elsewhere.

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BOOK REVIEWS AND NOTES.

ESSAYS IN SCIENTIFIC SYNTHESIS. By *Eugenio Rignano*. Translated by *W. J. Greenstreet*. Pp. 254. London: George Allen and Unwin, Ltd.; Chicago: The Open Court Publishing Company, 1918. Price 7s. 6d. net.

"The need that is making itself felt in science for unification and synthesis between the individual sciences is extending to all branches of civilization and even to civilization itself. Analysis, no doubt, is essential to the development of knowledge, but practised by itself it inevitably leads to the creation of water-tight compartments, unless subordinated to the final process of redintegration in the corpus of human knowledge." The world is ruled by ideas. We have already learned the futility of maintaining water-tight departments within certain branches of science. We are beginning to learn that the so-called "overlapping of frontiers" between certain branches of science is really a misnomer, for with the extension of knowledge we find that such frontiers exist merely as conventions which no longer have the excuse of being thought convenient. For instance, we read in the number of *Science Progress* from which the first two sentences of this notice are taken that the future progress of geology imperatively demands an amalgamation with the other sciences, or rather, perhaps, a recognition of the fact that the study of the earth includes in itself all the sciences. From cases like this, which may be multiplied, it is not far to the idea that there is a sufficient body of material common to all the sciences to justify the view that there is room for the advent of a new type of worker—the theorist pure and simple. As compared with the specialist in any department of science he will be in certain respects at a great disadvantage: but on the other hand he will be unhampered by much that prevents the specialist from shaking off the attitude of mind which is necessarily the outcome of a life of work spent in contact with the concrete.

M. Rignano's conception of a theorist whose width of reading and grasp of results achieved shall inspire him to creative effort in the detection of unsuspected analogies, in the framing of hypotheses, and in the opening up of wider horizons, is as attractive as it is suggestive. Perhaps in one direction he has been partly anticipated by the enterprise of Dr. George Sarton, whose efforts to place research in the history of science upon a proper footing have been so lamentably frustrated in Europe by recent events, but who, we are glad to say, is already reaping some measure of success in America. Dr. Sarton points out in a paper in *Scientia* on "The New Humanism" how a just appreciation of the signification of science, and of relative values, must be based on a knowledge of its history, and that at the same time that knowledge will serve to correct in the specialist the narrowness of outlook to which he is inevitably exposed from the very nature of his work, will confirm him in the disinterested course which he has adopted, and will go far to check every tendency either to empiricism or to prejudice.

It is natural that M. Rignano's suggestions should be exposed from the first to the charge of being too vague to be worthy of consideration. This charge has been anticipated by our author, who in this series of essays sets forth in the first place his reasons for believing his views to be feasible and necessary, and again how the work of the theorist may be done in the fields of biology and other allied natural sciences with the same prospect of success as has attended the so-called "intrusion" of mathematics into the field of physics. The author has with conspicuous effect explained his position, and the skill with which he has handled his subject is as remarkable as what will seem to many the audacity and the novelty of his views. In France and in Italy he has had nothing to complain of in the warmth of their reception, and as he claims that he has, after all, merely followed the example of some of the most famous English writers of the past, he should at any rate be rewarded by a careful examination of proposals which seem to so many of us to be fraught with hope for the future of science and humanity. γ

THE NEW TESTAMENT. Translated from the Sinaitic Manuscript, discovered by Constantine Tischendorf at Mount Sinai. By *H. T. Anderson.* Cincinnati: Standard Publishing Co., 1918.

By comparing this translation with the photograph of the Greek manuscript, the reader will discover two things:

1. Important matter omitted by the manuscript is added by the translator.
2. Important matter added by the manuscript is omitted by the translator.

Under No. 1 we refer especially to the Mark Appendix and the Adultery section in John. The Sinaitic manuscript ends Mark thus:

They said nothing to any one, for they were afraid of.................. Gospel according to Mark.

The English reader wants to see just how this venerable document looks in Greek. Consequently the addition of the second-century Appendix ("Mark" xvi. 9-20) falsifies this entirely. So, too, with the woman taken in adultery in John viii. The manuscript passes the story over in silence, but the translator inserts it with a note. The Bible Society does the same, both with Mark and John, in its edition of the Armenian Version, another of the ancient witnesses against these Gospel additions. Granville Penn, the grandson of William Penn, was the first to print Mark in English as it appears in the oldest sources, ending abruptly at xvi. 8 (London, 1836). That lay scholar rightly classed the familiar editorial addition as apocryphal.

Under No. 2, the Epistle of Barnabas and the Shepherd of Hermas follow John's Revelation in the manuscript, without any note to indicate that they do not belong in the New Testament. This is just the kind of fact which the serious reader wants to know, but the translator withholds the knowledge. The New Testament, in the fourth century, was not yet sharply cut off from the Apostolic Fathers, not until 397.

The translator died many years ago and represented a now extinct school of theological shuffling. The Standard Publishing Company of Cincinnati has done very wrong to perpetuate this sort of thing. In science, public opinion has always required literary men to speak the truth. In the twentieth century it expects religion to do the same. ALBERT J. EDMUNDS.

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THE MONIST

THE LOGIC OF THE SCIENCES.[1]

THE work of science is carried on by an increasing number of special sciences, developed in response to the necessity of increasing specialization and division of labor. This elaboration of science has been going on with startling rapidity in recent years. Lord Macaulay tells us that in his day the sum of human knowledge was of such small compass and was increasing so slowly that an active student might fairly comprehend all of its main facts and principles in a single lifetime. But this is far from true to-day. Not only can no one now keep up with the new learning, but no one can acquire in any detail a tithe of the existing learning. To take all of the different courses offered in any one year at any one of our great universities, such as Columbia or Chicago, would require the time of an average student for four or five hundred years. Our educational industry is thus busy multiplying thought-tools for all of our social occupations, and to secure effective cooperation between these occupations it is necessary for everybody to have some comprehension of the main problems of each, and of the means of solving these problems. Each of the different branches of education is thus attacking the social problem from a different point of view. Each abstracts, for the sake of intellectual convenience, certain aspects of the problem of developing the larger union; and as these branches become more efficient in producing truths useful in dealing with those aspects, they employ more and more the scientific method. If, therefore, we are to understand the scientific method of attacking the social problem, we must inquire how the special sciences are related to each other in the use of this method.

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[1] A chapter of a forthcoming book on Social Reconstruction.

Since the days of Auguste Comte, students have been clearly aware that certain grand divisions of science arrange themselves logically in a hierarchy according to their degree of abstractness and of consequent scientific development. Comte stated the series as follows: mathematics, astronomy, physics, chemistry, biology, psychology (transcendental biology), sociology—each of these terms, standing for a scientific point of view, or group of studies, becoming more numerous and more intensively specialized As these sciences are only divisions for convenience in one logically continuous social function of systematic reflection, there are no, and can be no, definitely fixed boundaries between the sciences. Indeed, the old boundaries are continually being obliterated by new sciences, such as symbolic logic, mathematical astronomy, astrophysics, physical chemistry, chemical biology, biological psychology, and social psychology. There seems to be in particular no logical justification for placing astronomy as one of the grand divisions of general science, since it stands for no general conception different from those of mathematics, on the one hand, and physics, on the other. Logic also should be placed first as the science of intellectual method in all problems. As the science of thinking, logic sharpens the thought-tools — categories — with which all science must work. It sharpens them—makes them valid, as we shall see later—by means of the categorical experience of unity.

Each of these larger divisions of science, indeed, is distinguished by the fact that it constructs its system of conclusions or truths from the point of view of a single conception, which we find we have to use continually in interpreting our universe. These major conceptions are unity, magnitude, energy, matter, life, consciousness, and society;

and the divisions of science which respectively elaborate their meaning for us are logic, mathematics, physics, chemistry, biology, psychology, and sociology. Of course, within each major conception are developed numerous subordinate conceptual distinctions: as, for example, in unity are the concepts of continuity, consistency, harmony, likeness, order, peace, and their opposites. Each of these grand divisions of science, in elaborating its own main conception, employs necessarily without much questioning the conceptions developed by the logically and "positively" prior divisions, but not so distinctly those of the later divisions.[1] This is what Comte meant by calling the series a hierarchy —that the sciences severally develop historically from the less scientific to the more scientific or "positive" form, in the order of their abstractness as indicated, those coming after being dependent upon those going before for the scientifically reliable truths with which to deal with their own less abstract, more complex problems.

This logical arrangement of the general sciences is indicated in the accompanying chart (No. 1). The chart is constructed to suggest, in brief and sketchy form:

1. The enumeration of the grand divisions of science in their logical sequence.

2. That this sequence is determined by the fact that each division interprets the universe in terms of a central conception, in the process defining the conception used. Thus logic may be defined as the science of unity, mathematics as the science of magnitude, physics as the science of energy, chemistry as the science of matter, biology as the science of life, psychology as the science of consciousness, and sociology as the science of society.

3. That in defining its own conception of the universe,

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[1] An apparent exception to this rule is the case of physics and chemistry. Because of our modern tendency to define matter in terms of energy, i. e., in terms of mass and motion, sometimes stated as electrical activity, chemistry tends to become a branch of general physics.

I. CLASSIFICATION OF THE SCIENCES.

GRAND DIVISIONS	LOGIC	MATHEMATICS	PHYSICS	CHEMISTRY	BIOLOGY	PSYCHOLOGY	SOCIOLOGY
Main concepts being defined	Unity	Magnitude	Energy	Matter	Life	Consciousness	Society
Main concepts used as previousy defined by science		Unity	Magnitude Unity	Energy Magnitude Unity	Matter Energy Magnitude Unity	Life Matter Energy Magnitude Unity	Consciousness Life Matter Energy Magnitude Unity
Space and time aspects in scientific method	Subject Predicate Copula	Problem Solving process	Statics Kinetics	Valence Reaction	Species Evolution	Elements Development	Organization Progress
Synoptic branches of the sciences	Philosophy Metaphysics Epistemology	Symbolical logic Theory of numbers, of Space, of Infinity, etc.	Mechanics Astronomy Geology Chemical dynamics, etc.	Theory of matter Gases Liquids Solids, etc.	Botany Zoology Ornithology Ichthyology Paleontology etc.	General psychology Social psychology Transcendental psychology, etc.	General sociology Geography Anthropology Archeology Social origins History, etc.
Specialized branches of the sciences	Formal logic Argumentation Logical critique of each of the sciences, etc.	Arithmetic Algebra Geometry Trigonometry Analytics Calculus Variable functions, etc.	Gravity Sound Heat Light Electro-magnetism, etc.	*Inorganics* Mineral acids Halogens Metals, etc. *Organics* Aliphatics Hydrocarbons Aldehides Alcohols Vegetable acids Esters, etc. Aromatics Benzine Carbohydrates Dyes, etc.	Bacteriology Anatomy Physiology Histology Neurology, etc.	*Projectives* (will, or motor reactions) *Reflectives* (Intellect, or cognitive reactions) *Affectives* (feeling, or evaluating reactions), etc.	Hygiene Economics Communication Pedagogy Ethics Politics Recreations Esthetics, etc.

NOTE: For other classifications see: Bacon (*Intellectual Globe*), Comte (*Positive Philosophy*), Spencer (*Classification of the Sciences*), Bain (*Logic*, pp. 627 ff). Pearson (*Grammar of Science*, pp. 304 ff), Thompson (*Introduction to Science*, pp. 81 ff), Flint (*History of the Classification of the Sciences*).

each science, with the exception of logic, employs as means the defined conceptions of the logically prior sciences. Logic, being the science of the very process of developing conceptions, must rely, for the testing of its own definitions, upon the immediate consciousness of unity as practical consistency in experience. This is the "logic" of experimentation. Of course, all sciences use experiment, but logic has to rely on it alone for the "given" means of verification.

4. That the elementary space and time aspects of experience appear in the method of all science as discriminations of structure and function, fact and change. Each science regards its subject-matter as a given system developing, and aims to define the development, i. e., to state the succession of forms the system assumes.

5. That the branches of each science develop from the synoptic to the specialized form, the former being the earlier effort to assemble data covering a wide range which is later more accurately classified and defined.

Let us now examine how each of the general sciences employs the historic method in defining the unity of experience from the point of view of its special conception.

LOGIC, we have said, studies the method of the formation and solution of all problems. It is just thinking become critical of its own method, so as to make the solving of the problem more swift and accurate. Let us emphasize again that logic is the science of unity, explaining what unity is and how it is maintained by thought as consistency, continuity, harmony in our experience. "That which, by the law of its being, intellect seeks above all and perpetually pursues and loves, is harmony. It is for a home and a dwelling with her that intellect creates a world; and its admonition is: Seek ye first the kingdom of harmony, and all these things shall be added unto you."[2]

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[2] Keyser, *The Human Worth of Rigorous Thinking*, p. 23.

"*The problem of logic* has a more general and a more specific phase. In its generic form, it deals with this question: How does one type of functional situation and attitude in experience pass out of and into another; for example, the technological or utilitarian into the esthetic, the esthetic into the religious, the religious into the scientific, and this into the socio-ethical and so on? The more specific question is: How does the particular functional situation termed the reflective behave? How shall we describe it? What in detail are its diverse contemporaneous distinctions, or divisions of labor, its correspondent *statuses*? In what specific ways do these operate with reference to each other so as to effect the specific aim which is proposed by the needs of the affair?"[3] With logic in the wider sense, as a critical theory of the relation of the social functions to each other, we shall have to do later when we discuss the question of scientific method in sociology. But at this point, where we are dealing with the method of the reflective function as such, in its systematic form as science, we are concerned with logic in its more specific form as the critique of science. The business of logic in this narrower sense, then, is to define for us the function of thinking itself, and indicate the conditions under which it fulfils its function.

Thinking arises as an effort of our activity to pass out of conflict and failure of function into union and achievement of function. In this process, logic discriminates two methods: deduction and induction. Deduction takes the familiar form of the syllogism, A is B, B is C: therefore A is C,—reasoning from the nature of a known whole system to the nature of its particular parts. There is, therefore, in deduction no real progress or growth of thought into a larger or previously unknown unity, no real transformation of an existing conflicting system into a new unified system, but only a clearer definition of particular things in terms of their places or functions in a system already well known. In induction, however, we do make progress in the transformation of conflict into cooperation by getting beyond the old system altogether. In accomplishing this, induction takes the form of the inference, at first in the form of a question: Given A, is A C?—which being interpreted, means, Is this present, conflicting, unsatisfactory system, A, resolvable into the harmonious, satisfactory system which I guess is C? In both the deductive and inductive forms of judgment the copula, "is," signifies a mental action. In deduction the act of solving the problem has taken place in the past, and we are only reviewing it to make clear the steps taken or the factors of the solution previously reached. Deduction, therefore, serves as an instrument of analysis—it tells what particulars to look for and expect in a given situation: if we have the system A, we infer we have as factors that make it up the particulars B, M, X, Y, etc. Thus deduction, by itself, simply reaffirms, reasserts, the existing present system, without transforming it or getting us beyond it.[4] But if this present system is felt to be conflicting and unsatisfactory, then induction is already at work in it, trying to formulate the new, more satisfactory system into which the old one must develop. In thinking we oscillate between deduction and induction; both are necessary; either one used alone or overemphasized leads to confusion and disintegration of experience.

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[3] Dewey, *Essays in Experimental Logic*, pp. 97-98.

Thus, deduction is analysis, whose function is to bring to attention the factors of the old system. Of itself, deduction does not develop a new system, it merely emphasizes the old, it does not employ experiment—for the relations of the system are all known; and for the same reason it does not develop new truth. Induction, on the other hand, is synthesis, whose function is to construct a new system, in part of factors of the old, and in part of new factors developed in experiment. Induction alone, however, can no more develop a new system than can deduction. The analysis of deduction is required to bring out both the factors of the old system that must be thrown out as no longer serviceable, no longer true, and also those that are still serviceable and true. Thus, the more deduction insists on the old system, the more induction insists on the new. (Where we have the dangerous extreme idea of the civil law as insisting on subservience of the individual to the present system without any change in it, there we are sure to have the opposite dangerously extreme idea of the entire abandonment of the existing law and system, in favor of an impossible, entirely new system.)

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[4] Cf. Baldwin: *Genetic Logic*, Vol. II, pp. 331-3332: "Inductive inference. therefore, is the process of the constitution of wholes of meaning in this or that control sphere; while deductive inference or implication is a movement of thought, whether one of relatively simple inspection or one of relatively detailed elucidation, within the whole already in some sense grounded or established."

Logical Nature of a Law.—What thinking is always trying to do, as a means of keeping up the unity and growth of experience, is to define the relation of something concerning the thinker to the whole in which it is a member. General philosophy calls this action of thought "defining the relation of the particular to the universal." Whether it be the relation of the organ to the organism, of the word to the sentence, of the factor to the solution of the problem, of the habit to the character, or of the individual to society—in every case it is the definition of the relation of a member to the body whose unity and identity it cooperates with the other members to maintain and express. This is what science means by a law. Whether it be a so-called natural law of physical nature formulated in a laboratory, or a civil law of society (which, in a sense, is just as natural) formulated in a legislature, the law is in principle the same: a statement of the observed and tested relationship of a member to a body of members in which it has its meaning and its existence. The law thus universally is a statement of a set of given conditions and a logical (ultimately practical) consequence, in the form, If A, then B. Assuming A represents the general system or body as given, and B the member, then the deductive form of the law would be as above: if A, then B, indicating that in a given system or body, A, a particular member, B, is operating at a particular point in a particular way. The inductive forms of the law would be the reverse: if B, then A, indicating that, given a member, B, as behaving in a particular way, the system, A, of which it is a member is inferred from its behavior. So astronomers, from observation of the sun and planets have inferred the nature of the solar system; and zoologists, reasoning from a few bones of an extinct or a new species of animal, have constructed with considerable accuracy the whole skeleton. Science thus enables us to predict, to anticipate, to construct as an ideal a system of relations in which we ourselves must function as factors in the future, and by this anticipation science enables us to reconstruct our own habits so as to function efficiently in the new system.

Transcendental Action of Judgment. — How do our minds achieve this anticipation? How do they transcend past experience in the construction of the new system? How do they proceed to set up this new system in ideal, so that, as a working hypothesis, it shall express the probable new relationship of the member to the system, and, upon test, turn out to be the new truth that guides our action in meeting some later situation? Every act of thought, every judgment however vague or abbreviated, every sentence, has, as before stated, a subject and a predicate. In the live judgment, where thought is actively engaged in trying to identify something, to place it in a system of relations, the subject is the accepted, unquestioned aspect of the situation or thing presented; the predicate is the uncertain, questioned aspect, something tentatively affirmed but not immediately apparent. That is, the subject is the fact aspect and the predicate is the hypothesis aspect. In the beginning of the act of thinking, as, for example, in trying to identify an object approaching in the distance, the judgment takes the form: This is what? But even in the beginning, the subject is not merely "this" and the predicate is not merely "what," for the subject will have some immediately identified and accepted characteristics, such as color, size, and movement, and the predicate will consist of an immediately suggested hypothesis or series of hypotheses, such as man, horse, etc., because of the fact that every stimulus—every excitant attended to—means that a response is going on, that habitual, reflex actions are taking place through race instinct and other unreflective reactions derived from the past, representing organic functions maintaining their adjustment with the environment. There is, in other words, a functional adjustment already at work when reflection begins, and reflection arises because the adjustment has become insufficient to enable our functions to maintain the unity of our experience. As long as we are unable to identify the object, we feel impulses to move in contradictory ways, corresponding to the various hypotheses we entertain about it. Is it a friend expected?—is it a mad dog?—is it a creature we have never seen before, but like a horse? Each of these hypotheses brings to mind certain characteristics of color, size, movement, etc., which we compare with the like characteristics of the object in question. The predicate as hypothesis, therefore, is a system of relationships developed as a solution of past problems of adjustment and temporarily accepted as a truth unquestioned for the purpose of identifying the subject and securing adjustment in the present problem. If, by the experimental tests of observation, motions, calls, etc., we find that the features and behavior of the object are largely identical with those of our hypothesis, then we are able readily to identify it, classify it, take a definite, unified attitude toward it. If, on the other hand, we have no classification, no truth, no system, within which the object will cooperate as a member, then we have to develop a new class, a new truth to explain it. We observe it and stimulate it more carefully to get a larger number of its reactions and characteristics, at the same time comparing them with those of the class or system in our experience most nearly like the object, until our own reactions to it, beginning as if it were in the familiar class, become definite and assured as new habits in a new system. Thus, some of the factors of the old system are carried over into the new, to serve as the bridge of truth between the two. If it were not for these old factors, which represent old habits in ourselves found to be still useful in the new situation, we could not deal with the new object at all, in fact we should be unconscious of it. But by our direct experimental dealing with the new object we have set up new habits which define the new factors of the new system.

This problem of the development of the subject-predicate distinction is perhaps the most profound and far-reaching question in philosophy; for it involves the whole question of the reality of the growth of the universe, and, in human consciousness, the question of how a new idea or thing can possibly originate. The critical cases in point are the earliest experiences of infancy, and the inventive activity of the genius—the scientific discoverer or artist. My own view is that consciousness, as human beings experience it in its reflective form, is not, in its elements, essentially different from the universal evolutionary process of adjustment by stimulus and response, but is just an advanced stage in that process. The critical case of rudimentary reflection in earliest infancy suggests that distinctions of subject and predicate must, in some sense, antedate birth as factors of adaptation and of growth. If we are to hold consistently the doctrine of an evolving universe we must believe that consciousness is not an alien entity breaking into evolution from outside at some point—say, where self-maintenance or where self-consciousness is assumed to begin; but is rather, in its essential elements, the universal process of adaptation itself, existing not only in the sub-human and sub-animal worlds, but also in the so-called inanimate world, as the function of stimulus-response in all activity, now being recognized in the electrical theory of matter. In this stimulus-response process, all the way down the line the consciousness of the higher, later forms seems, as a matter of observed fact, to help in giving direction to the process in the lower, earlier forms—conspicuously, for example, in the case of parent and child—but not without the initiative and cooperative effort of the latter. In the case both of the child and of the inventor making a new discovery—wherever intelligence is promoting growth—it may well be that suggestions from higher intelligences are cooperating with the initiatives of the lower to produce the adaptations necessary for growth in both. This view seems to do justice to the claims of both the intuitionalists and the rationalists, and offers a logical basis for a democratic theology, a democratic politics, and a democratic educational policy.

Practical Nature of the Criterion of Truth.—We have been maintaining that logic is the science which explains the meaning of thinking, in terms of the concept of unity or consistency. As already suggested, this conception means primarily the system of our own personal activities cooperating to maintain a satisfactory continuity of our experience. In the last analysis, it is the progressive realization of this conception in practice which serves us as the criterion of truth. As every problem means an effort to change a confusing, uncomfortable diversity into an intelligible and, somehow, comforting unity, any statement of conditions that guides us in making the transition, and thereby is identified as a consistently cooperating factor in the solution, we call truth; any statement which does not give us the solution, does not lead to satisfactory unity, or is inconsistent with it, we regard as error or falsehood. The phases of inference, deduction, induction, agreement, disagreement, etc., which logic discriminates in our thinking, are all subordinate functions in our effort to formulate the conditions of the situation, so we can make them maintain the growing continuity of our experience in the emergency when the rapid development of new, incompletely incorporated factors threatens to disorder and disrupt it. The necessity of maintaining the union requires that we formulate the law by which we can make the new factor cooperate to that end as true; or else, finding it cannot thus cooperate, that we cast it out as false. The standard of truth, as for all other values whatever, is the maintenance of the union. In other words, experience *as a whole* is the standard by which we test the truth or worth of any phase of experience.[5]

[5] The process has been illustrated by the case of a man lost in the woods, who, trying to find his way home, has to devise a theorem, plan, or hypothetical map of his situation, in which the known features in his immediate vicinity—the slope of the land, the direction of the streams, the direction of the sun, etc.—are used as suggestions of the unknown parts connected with them beyond his observation. He proceeds to solve his problem by going from the known to the unknown in accordance with his hypothesis, and reaches a solution when he proves his hypothesis true by arriving home. This illustration, given originally by Professor Dewey (see his *Essays in Experimental Logic*, p. 237ff), has been criticized by Professor Baldwin, who dissents (incorrectly, I think) from this view of the criterion of truth, which he calls the "action theory." (See his *Genetic Logic*, Vol. II, p. 345ff.) The controversy turns on the old question of the nature of success. Professor Baldwin asks, "What has constituted the correctness, or truth, of his plan?....How does the man know his action is successful? The only answer is....by *the perceptual experiences* found to be what the thought or memory presented in image.... The test, then, is a *perceptual experience fulfilling the details of the plan that guided his action*....The 'success' necessary, therefore, does not attach to acting thus or so." Professor Dewey answers (*Essays*, p. 240), "If we exclude acting upon the idea, no conceivable amount or kind of intellectualistic procedure can confirm or refute an idea, or throw any light upon its validity. ....If by acting in accordance with the experimental definition of facts, viz., as obstacles and conditions, and the experimental definition of the end or intent, viz., as plan and method of action, a harmonized situation effectually

Significance of This View of Truth and Its Criterion.—Now this doctrine—that the standard is the union, and that truth is instrumental, that truth is an invention which helps to maintain the union, and, when ceasing thus to function, must be repaired or discarded in favor of a more effective form,—this doctrine has some interesting logical implications.

In the first place, union or experience as a whole must mean more than what we ordinarily mean by individual experience. As the individual is a social member, experience *as a whole* must mean social experience so organized that, as it focuses in the individual, the individual's activities are satisfactorily unified and his services to the union increased in value. Likewise, the union must mean the universe so organized that the individuals carrying on its functions find their activities satisfactorily unified and effective for supplying their needs. (This can be made clearer when we come to discuss the relations of the social functions to each other.)

In the second place, this doctrine of the instrumental nature of truth and the normative nature of the common life, completely reverses the fundamental relations of these conceptions as they were held from the time of the ancient Greeks to our own day. Formerly, the universe being regarded, not as growing, but as fixed, truth was also regarded as a fixed thought-copy of the universe of which portions were progressively made known to the individual,

presents itself, we have the adequate and the only conceivable verification of the intellectual factors. If the action indicated be carried out and the disordered or disturbed situation persists, then we have not merely confuted the tentative positions of intelligence, but we have in the very process of acting introduced new data and eliminated some of the old ones, and thus afforded an opportunity for the resurvey of the facts and the revision of the plan of action." In other words, the test and criterion of truth is the practical unity of our experience as a whole resulting from our acting on an idea or plan assumed to be true. Being lost means disunion and confusion culminating perhaps in hunger and death. Home means not merely a "perceptual experience," but union, consistency in active experience—which is the test of success. Any other idea of the matter has across it the shadow of the old conception of thought as a mere copy of an ontologically external reality.

not mainly or in principle through the effort of human intelligence (which was considered as alien to the truth), but through revelation by "authorities" acting by "divine inspiration." This was the dominant theory of truth quite naturally during the centuries when, the means of knowledge being limited and monopolized by the few, the masses of the people were like children under the tutelage of their autocratic rulers. The masses have largely outgrown despotic tutelage. The democratic revolution has brought, as its very heart, a thought-revolution as sweeping as that of the Copernican theory of the solar system. It is therefore no accident, in this day when the citizen is becoming the sovereign, that truth as an autocrat is being replaced by truth as a servant. Man is not made for the law, but the law is made for man. If, then, man—mankind—organized, united, growing society in which the individual attains real freedom,—is indeed the end and standard of all validity and worth, we are under the imperative necessity of defining that standard more accurately than we have yet done.

In the third place, truth, as our most important means of keeping up the continuity and growth of experience, is, as has been suggested, a bridge between the past and the future. Like all other bridges, it should be built as strong and permanent as possible, and should be kept in good repair with a minimum disturbance to the traffic. Every emergency of experience requiring the action of judgment to maintain its continuity, is like a chasm over which we find we must pass, and truth is the tested, reliable bridge, binding the two sides together into one continuous experience. Every passage over the bridge of truth to some extent reconstructs it, enlarges its meaning and usefulness—but specialists, called scientists and philosophers, are required to assist in reconstructing it fast enough to sustain the increasing commerce of the world. Any inexpert or careless tampering with the bridge is, of course, resented by humanity as dangerous to the common welfare. The bridge derives its form, quality, and permanence from the nature of the traffic it serves, not *vice versa*. No doubt, this way of putting the matter is sufficiently irritating to the feeling of those who hold to the older theory of truth as an external copy of a fixed reality, but the logic of modern science and practical thinking seems to be dead against their view. The fact seems to be that science and other forms of experience are continually improving the bridge of truth so that subsequent heavier trains of experience can operate to supply the growing needs of the world.

MATHEMATICS, like every other science, has its origin and application in the concrete problems of our social life, whether they be those of navigation and surveying, of buying groceries at the store, or of simply trying to reach an object with the hand. From these concrete problems mathematics abstracts, that is, gives attention to only the quantitative relationships (as 2, triangle, etc.), assuming or ignoring all the other aspects.[6] Thus simplified, the subject-matter is easier to think about in a clear and definite way. The science begins, both historically and logically, in the axioms, that are logical definitions of the mere quantitative aspects of our own sensations and motor activities, out of which all our notions of magnitude arise. It is especially by reflection on our own movements,—their repetition, change of direction, and duration, embraced within the continuity of our consciousness—that we construct our time and space axioms of mathematics, such as "$2\times 2=4$" and "The shortest distance between two points is a straight line." We may say that the simplest axioms constitute our consciousness in its lowest terms, as vaguely defined in the early experience of the infant, or in the beginning of our attention to particular objects in any problem. They are the premises in concrete thinking just because they are the simplest statements of the relationships between our initial conscious impulses, prior to which we are not able to distinguish any antecedent conscious conditions. By means of these initial definitions mathematics solves its simplest problems of quantitative relations; and then using these solutions as truths for the solution of more complex problems, and these again for others, it progressively constructs a series of judgments, each depending for its validity upon a prior, and forming a branching "tree" of subjects, from simple arithmetic to the higher theories of variable functions. These subjects constitute an elaborate series of thought-tools, adapted to guiding judgment in a series of practical problems of increasing complexity, from measuring a piece of goods to the construction of a railroad bridge, or the location of a star.

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[6] Professor Keyser, in his interesting lecture on mathematics, takes issue with this position (*op. cit.*, pp. 276-279). He points out the wonderful expansion of mathematics in recent years, and shows how logic and mathematics have met in the borderland of symbolic logic, as developed by Leibniz and others—and is inclined to identify mathematics with all strictly valid thinking. I believe it is more useful to regard logic as the prolegomenon of mathematics, and define mathematics as the science of the unity of magnitudes.

How, then, does mathematics, as a typical science, solve a problem? Take, for example, geometry, and the simple problem of determining whether the theorem be true that the sum of any two sides of a triangle, ABC, is greater than the third side. Of course, this is no longer a real problem to us of mature years because we have so often proved it true by acting in accordance with it in moving or going from one place to another. But there was a time in infancy when for each of us it was a real problem; and the question is how our minds proceed to determine the truth. In the first place, we deductively discriminate familiar aspects of the strange situation, ABC, confronting us. If the situation were entirely familiar or had no familiar aspects we should not in either case, be conscious of it as a problem at all. The problem consists in determining the relationships of the unfamiliar to the familiar so as to comprehend the situation as a whole. The familiar means an old way of thinking and acting, the unfamiliar means a modification of the old into a new way demanded by the new situation. Let us assume that the old habit of action has been direct, i. e., movement aiming to reach things by a straight course; therefore in practice we have been accustomed to the axiom—without definite formulation but operating in the form of habit as a truth—that a straight line is the shortest distance between two points. The straight lines would be the familiar aspects, then, of the new triangular figure, and any of them constituting a side, as AC, would be shorter than any other line, as ABC, passing through the same points. Applying the same reasoning to each side in turn, the theorem or hypothesis is established as a truth that can be similarly used to develop still other truths and guide activity. In this process both the old familiar figure, the line, and the new unfamiliar figure, the triangle, have acquired new meaning. The line, by becoming a member in a new system, functions as a new thing in our experience; and the triangle, as being composed of lines in a definite relationship to each other, becomes defined and available for use in reaching other conclusions. Practically, we may say we have thus learned that we can reach a point not only directly but also, with more time and effort, by a roundabout way, if we have the two ways definitely related to each other in the same system or map of conduct.

Now mathematics constructs systems of relations between mere quantities or abstract magnitudes, and tests them out as truths, in the same general way that the biologist does his systems of bones. The typical form in which the mathematical systems are stated is the equation. A mathematical equation is just a symbolic or shorthand description of a series of operations ending in an answer—a confirmed hypothesis which states a satisfactorily unified experience. If we say $6 \times 5 = 30$ we mean (since multiplication is a quick way of performing the operation of addition), take six like systems, each containing five like things, and assemble them all together into one system—and you will have thirty like things in the new system. To the person who performs this operation for the first time, thirty is a genuinely new system of experience, reached by taking six of the old familiar systems of five units, and assembling them so that they lose their old identity, their old separate unity, and merge into the new unity of the system of 30. Thus, an equation as a statement of a method of solving a problem, is not merely an expression of static, quantitative identity of the terms of the two sides, but rather an expression of dynamic, qualitative change of an old experience into a new one, in time and space. The operative symbols, × (times) and = (equals), indicate the dynamic character of the equation, the changes in the process; the quantitative identity of the two sides indicates the continuity in the process—one continuous transformation of the old into the new. The asserted equality of value of the two sides means that the process of transforming the old system of experience into the new is equivalent to the new.[7]

The work of mathematics is to make accurate and reliable our calculations of merely quantitative relationships, but obviously it cannot be our sole guide in the business of life. The very fact of work means energy, about which

[7] Stated in terms of moral experience, this means that the conduct which achieves the end has all the value of the end; or, in other words, the end or ideal is the guiding, evaluating factor in conduct—not something lying *beyond* it, and therefore unattainable. The end is the function. In a democratic, united, normal society, "Virtue is its own reward," art is its own reward, fellowship is its own reward, industry is its own reward. If the process leads to a valuable result, it has the value of the result—to whoever realizes the value. The value of an end, an hypothesis, an ideal, is the degree in which the process of realizing it introduces order, freedom, and satisfaction into experience. The social problem is just that of enabling all the workers to experience the full value of their work—in other words, to achieve a democracy, a union in which they shall all be members.

mathematics, as such, tells us nothing but the quantities of it; but we need to know also how it may be developed, changed from a kind useful for one purpose into a kind useful for another purpose. For an explanation of this we have to look to the science of physics.

PHYSICS, then, takes another step in developing an answer to our social problem by making clear to us the nature of energy as the power of doing work. It analyzes the different kinds of energy that we distinguish by our different senses, as mechanical energy, sound, heat, light, electricity and magnetism, gravitation, expansion of gases, and in doing so treats of matter only as a manifestation of energy, that is, as mass in motion. As an attempt to explain from the standpoint of energy how a universe is developed, physics is also historical in its method. It is a deliberate effort to formulate the method by which energy is transformed from its "natural" into its artificial manifestations, to give us the means of catching energy at its birth, and training it to the work of ordering the universe to serve the interests of man. In doing this physics has its genetic classifications of things as gases, liquids, and solids—as atoms, molecules, and masses—each with its specific motion as a function of its energy. Thus, in telling us what iron is, physics tells us the amount of heat required to change it from a solid into a liquid and a liquid into a gas, tells us what its specific gravity is, how well it conducts electricity—in short, how it behaves in furnishing energy for the world's work.

But magnitude and energy are obviously not the only general aspects of the universe that we have to take into account in dealing with it satisfactorily. Our senses of taste and smell especially indicate that things are made of quite radically different materials, and it is the science of chemistry which undertakes to carry us a step farther in controlling our commerce with the universe, by showing how we may produce things by controlling the materials of which they are made.

CHEMISTRY, as a science of matter, undertakes to tell us the story of the composition of things out of their physical elements, and points out how we can get control of the elements of some things that we want to use, by decomposing other things that we do not want to use (except as decomposed). When, for example, chemistry tells what water is, it tells how water has been historically developed, how we may produce it by extracting hydrogen and oxygen from things constituted partly of them, and then recombining them intimately in the proportions of two volumes of hydrogen to one of oxygen. The formula of water, H_2O, is thus a shorthand symbol of a material process of genesis (we may even say, of Genesis) in which the relations of chemical combination of certain elements are indicated. In its definition of things as elements of matter undergoing decomposition and recomposition, chemistry employs the general conceptions of magnitude and energy developed by mathematics and physics, and, of course, their classifications, but adds classifications of its own, in the historical form as elements, simple (inorganic) compounds, and complex (organic) compounds. This, science tells us, is the historic order: elements, non-living compounds, living compounds; and chemistry aspires to point out the methods of chemical reconstruction throughout the entire series.

But, after all, when we want to build a bridge of iron, drink water, or make seeds germinate, we have to know more about the universe than mathematics, physics, and chemistry assume to tell us. We have to know more about the behavior of things, for some things have a remarkable power of initiating and controlling changes, physical and chemical, that are not accounted for by the formulas of these sciences.

BIOLOGY, as the science of life, approaches another step toward a solution of our social problem by defining exactly the conditions under which certain things we call living. initiate and control changes so as to perpetuate their own identity—that is, cause changes to take place as a periodically recurring cycle that maintains and develops the body through which they take place, against the forces that would otherwise disintegrate it. So biology adds a new general conception or class of relationships to those of the logically prior sciences by directing attention especially to the life process, and defining things, iron, water, seeds, etc., as factors in this process. And just as logic, mathematics, physics, and chemistry, each from the point of view of its special conception, classifies an historical continuity of living relationships, by classifying living forms in an evolutionary series from the lowest—i. e., earliest—plants to the highest—i. e., latest—animals. Biology thus endeavors to show how an individual maintains itself, how it produces other individuals, and how types of living individuals develop into succeding types.

Take an illustration of thinking involved in biology, say, that of a naturalist, whose business is to define the terms and conditions of our reactions to our physical environment, so we may maintain the unity of our experience under new physical circumstances. Suppose he is walking in a field and sees a bird fly and alight at a short distance. Since he is looking for field birds, having in mind the familiar system of their characteristics, he quickly notices the markings as those of a pheasant. If nothing in the situation seems to contradict the conclusion, his judgment may end there as a rapid alternation of induction and deduction, chiefly the latter. As he is looking for something new, his mind is at the start in the inductive attitude, but the first perceptions having so vividly suggested the pheasant that that conception dominates his thinking, he deductively enumerates the characteristics of the bird before him and passes on to some other judgment. But suppose something in the situation does seem to contradict his first conclusion. Suppose he notices the bird has, in addition to some of the familiar characteristics of the pheasant, also other markings and manners not of that class as he has known it. The appropriate reaction toward the creature is thus in doubt—what the present system of experience is, is uncertain—and this uncertainty is reflected in the transformation of the original tentative conclusion into a working hypothesis to be experimentally tested. Our scientist whistles to the bird and hears in answer a strange call. He approaches it and observes more closely its appearance. This may suggest some other hypothesis, e. g., that the bird belongs to some other class than that of pheasant, perhaps more exactly a grouse or large quail. Repeated comparison of the characteristics of the bird with those of known species may convince the naturalist that he has discovered a new species of pheasant—determining conditions of new forms of human activity. If the species proves to be specially good for food, it may be rapidly killed off, or may be protected and multiplied with consequent rapid alteration of the insect and plant life of its environment, i. e., with considerable transformation of the world in directions determined by the interests of man.

This is what any discovery means: a dynamic transformation, not merely a static revelation. And let it be noted the transformation takes place, not only in the conditions of objective experience, that is, in those habitual experiences where reflection is not prominently concerned, such as dining, reaping, admiring colors, etc., but the transformation occurs also in the conditions of subjective experience as a change in the very truth by which the transition from the old to the new was accomplished. There is no sense in which any *particular form* of truth exists prior to the discovery—the thinking process through which it is constituted as outcome of the effort to maintain the unity of experience in the emergency of a conflicting situation. If it was formerly true by tested and accepted definition that all pheasants had brilliant plumage, then it was not true that some pheasants have drab plumage until after some exigency of maintaining a unity of experience resulted in the modification of the genus "pheasant" to include the species with drab plumage. In this way every fact added to existing knowledge transforms preexisting fact and makes truth different from what it was before. In a growing universe there is no absolute ultimate fact. But biology does not ask especially what part consciousness plays in the life process. This explanation is left for psychology to define.

PSYCHOLOGY defines consciousness as an especially expeditious method of control in the life process. It is awareness of relationships and values, in a transition of activities from confusion to cooperation, from disunion to union, the awareness itself operating to facilitate the transition, harmonize the relationships, and increase the values of the activities.[8] Of course, psychology is as unable to give a complete definition of consciousness as logic, mathematics, physics, chemistry, and biology are to define completely—that is, practically—their own special conceptions: for each conception can be *practically* apprehended only in the light of all the others, including that of society. Each science uses, as clear and definite for *its own purpose,* the conceptions of the logically prior sciences, but in doing so, as we have seen, it modifies, enriches, the meaning of the conceptions used; and it assumes as a vague background of its thinking the conceptions of the logically subsequent sciences. Thus psychology may undertake to define consciousness in merely physical terms, as a change of environmental, overt forms of activity (matter in motion) into organic—neural—activity, such that the transformation issues again in environmental activities. But if we stop here we have totally failed to define consciousness. For the essence of consciousness consists in the values and change of values of activities, with reference to the maintenance of our own personal unity. The concept of the physical thus gets a new meaning by the necessary introduction of the concept of value, inherent in consciousness. And the concept of value, or of consciousness (as used by psychology) vaguely anticipates the concept of society (as developed by sociology). Value is developed in the performance of a social function. The individual is a social member. We cannot understand therefore what consciousness means (that is, as something leading to practical ends) until we understand more definitely about society as sociology interprets it; for all practice is social, i. e., involves social relationships intrinsically. It is indirectly for the valuation and control of these intrinsic, practical, social relationships—for the satisfaction of human interests, the discharge of human functions—that the concepts of all science are developed.

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[8] The modern definition of consciousness excludes the idea that it is an entity composed of a "soul substance." The psychical or subjective is the system of evaluating functions that maintains and develops, at the same time and in the same degree, our personal identity and the unity of society.

In interpreting the phenomena of consciousness, psychology, true to the method of science, classifies its subject-matter in a genetic series as successive phases of consciousness—successive forms of judgment of increasing comprehension, adapted to situations of increasing social complexity—from vague and fleeting sensation through perception and reasoning to the higher forms of the moral and esthetic judgment. By these classes of judgment, psychology undertakes to define in terms of conscious processes the various mental attitudes, habits, and ways of acting that people are observed to assume. But, as we have seen, these judgments presuppose certain social situations, to which they are relevant as the agencies through which social conditions are evaluated and adjusted in the development of the larger life.

SOCIOLOGY, then, undertakes to construct the classifications of the social situations which call forth the characteristic reactions of the individual, as defined in psychology. In other words, sociology endeavors to explain society as a system of cooperative relationships between persons so that the individuals cooperating can adjust their conduct to the satisfaction of their needs. In this work, social psychology has recently been developed as a connecting link between the older psychology and sociology, to show the relationship of the individual, as psychologically described, to the world of people, as described by sociology. Mob psychology, pathological psychology (that of insanity, etc.), and transcendental psychology (that of mediumship, etc.) also have been recently developed to interpret social phenomena that psychology seems best able to explain. But in interpreting these and all other social phenomena, sociology is obliged to employ all of the major concepts defined by the logically prior sciences: consciousness, life, matter, energy, magnitude, and unity; and in so doing, deepens their meaning.

Chart II, Classification of the Social Sciences, is inserted here to suggest, in addition to the points of Chart I, how the particular social sciences are rapidly developing as reflective specialization upon the various problems of social practice. If, as we are maintaining, any science is merely a clarified development of common-sense thinking, then the logic of any science is an exposition of how its method does interpret and clarify ordinary thinking. Suppose we take, as a single illustration, the logic of lawmaking as the basis of the growing science of legislation. While doubtless legislators, as a rule, have not been conspicuous for the use of scientific method, yet as above suggested, the operation of intelligence in the making of civil laws proceeds by the same universal process of thinking as does the formulation of a law of physical nature. And legislators are surely as much in need of science as are physicians and engineers. If we can make clear, then, what the universal process is in thinking as applied to lawmaking, we may be able to make legislation as scientific as biology or physics. We have seen that any truth is a statement of the relation of a particular to a universal, of a member to a system, determined as a solution of a past problem, and used without question as a means of reaching

II. CLASSIFICATION OF THE SOCIAL SCIENCES.

SYNOPTIC SCIENCES

General sociology	Geography	Social origins
Anthropology	Ethnology	Social evolution
History	Archeology	Municipal sociology
		Rural sociology, etc.

SPECIALIZED SCIENCES

Sciences of Maintenance		*Sciences of Reflection*	
Hygiene:	2 *Economics:*	3 *Information:*	4 *Pedagogy:*
Eugenics	Commercial geography	Language	Primary
Dietetics	Extraction	Investigation	Secondary
Therapeutics	Technology	Statistics	Higher
Sanitation	Management	Accounting	Technical
Labor	Finance	Journalism	Homemaking
Family	Transportation	Bibliography	Medicine
Consumption			Business
			Communication
			Education
			Ministry
			Government
			Recreation
			Art

Sciences of Control		*Sciences of Recreation*	
Ethics:	6 *Politics:*	7 *Fellowship:*	8 *Esthetics:*
Conduct	Legislation	Etiquette	Dramatics
Theology	Law	Entertaining	Music
Homiletics	War and defense	Sports	Literature
Missions	Penology	Play	Painting
Philanthropy	Administration	Dancing	Sculpture
			Architecture
			Landscape art
			Craftsmanship

a new solution—the method of organizing a new system. Any body of civil laws is a set of statements of the relations of individuals to society, determined as the solutions of past problems securing the effective cooperation of individuals in maintaining the social union. As society grows, as population increases and becomes more interdependent, we find that the union is continually tending to break down at certain points, for new methods of cooperation are necessary to maintain it; hence, new laws, as statements of the new methods, are continually necessary to enable people to understand how to cooperate.

The scientific legislator proceeds like any other scientist. He observes a breakdown of the union at a particular point, formulates an hypothesis of the kind of system which at that point would maintain the union, tests his hypothesis by public discussion and perhaps overt trial of unenacted custom; then states the social reaction against violation in the form of specific penalties, the reaction in favor of maintenance, as conducive to union, in the form of positive provisions for carrying it out. As old habits often appear under new conditions in disguised forms, we are not always able to perceive their consequences readily and judge them accurately, as in cases where we continue to punish a man for stealing a horse and praise a man for stealing a railroad. This is due mainly to the fact that the social union is always outgrowing our consciousness of its extent and cooperative requirements, as amply indicated in some quarters by insistence on mere nationalism as against internationalism. Internationalism is simply the inevitable, coming larger union, whose new laws of relationship we are endeavoring to state in the constitution of a league of nations.

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THE DEVELOPMENT OF THE NOTION OF CAUSE.

THE animal kingdom is very obviously divided into very different species. The difference to the eye between a lobster and an eagle is so great that it is difficult to realize they have anything in common. The pre-evolution notion that specific acts of creation were required to beget each animal species, well suits the extraordinary diversities that present the animal kingdom in the guise of a disparate collection of eccentric shapes and fashions. If we think of the more fantastic of living animals, such as the lizard, the serpent, the kangaroo, and the sea-lion; add to them the extraordinary variety of size, shape, and habit revealed in the modern reconstruction of prehistoric animals; and contrast the polymorphous, almost invisible, ameba of the stagnant pool with the huge elephant of the jungle, we realize very vividly how nature has concealed the continuous course of evolution beneath a bewildering array of diverse forms.

When evolution culminated in man, this distribution into widely differing biological species ceased. The different races of men represent simple variations of the same biological pattern. The minor variations within the human family, such as differences in color, stature, and hair, are but the faint echoes of those deep diversities that seem to divide the animal world into species with no visible points of contact. The men who lived more than 400,000 years before the Sphinx set her watch on the desert, seem to have been, when mere minor variations are counted out, biologically identical with the man of to-day. Evolution exhausted her stock of biological diversities by her previous prodigality, and continued to shape man in the same biological mould.

But within the evolution from primitive man to the civilization of to-day there is a parallel to animal diversity. Biological species have been succeeded by ***mental*** species. There is a difference of mental habit between the man of the pliocene and the man of the modern city comparable with the contrast between the crustacean crab and the avian swallow. Mental diversity and biological diversity cannot be compared as two mountains can be compared in size—it is remotely metaphorical to compare the mental distance between a Kant and a primeval savage with the biological distinction between an ameba and a tiger. There is a parallel, however, as evident at it is wide. Widely diverse biological species mark stages in a continuous evolutionary course. The history of human thought reveals a continuous mental development connecting many diverse mental species.

There is the force of a revelation in passing from the perception of the remarkable diversities to their underlying connection in the process of evolution. To appreciate the full uniting strength of evolution, the first vision of the earth as the habitat of apparently disunited kinds is an indispensable preliminary. The realization that men do think differently, and often so differently that they seem to be as divided mentally as the sea-urchin and the rhinoceros are divided biologically, during the different stages of human thought, should precede the attempt to understand how the mind of the primitive has grown into the mind of the modern European.

Wundt remarks that there are two sets of data for deducing the habits and thoughts of primitive man—***under*** and *on* the earth. The skeletons from prehistoric graves or the implements buried in the earth give relatively little information of value for the knowledge of the primitive mind. The debris of primitive culture scattered *under* the earth's surface do, however, support, if they do not prove, the inference that primitive culture in general has been very stable, and confirm the conclusion that the primitive mind can be studied *on* the earth. Wundt means that primitive habits of thought are still preserved in the backward races of the world. The first men have left no trace either of themselves or of their thinking; but they have bequeathed, if not their actual beliefs, their general habit of belief to many yet undeveloped races. By investigating the beliefs of the earlier civilizations as they are recorded in myth, folk-lore, epic, sacred writings, or inscribed monuments, more particularly by the study of living backward peoples, it is possible to distinguish with some degree of adequacy the mental species that line the route of evolution. Two sharply defined types of primitive belief (selected from among many) serve to indicate the mental chasm between earlier and later thought. An appreciation of this chasm prepares the mind for a more vivid apprehension of the remarkable movement of thought that has bridged its opposite and seemingly remote sides.

A modern novel illustrates a curious persistence of one way of thinking favored by the primitive mind. Since it is obviously a relic of a past mental habit its incongruous appearance in a modern setting emphasizes the difference it really establishes between the primitive and ourselves. The author announces his program in a preface. He intends, he informs us, to *prove* that women can succeed as well as men in the professions. His thesis, that women can paint and write as ably as men, is probably quite unexceptionable—perhaps is a modern advance on the primitive incredulity. His *proof* is as primitive as his thesis is modern. He dresses his two heroines as men, he sends them into the arena of life, one as a painter, the other as a journalist; and he makes them succeed by the simple process of describing their success. This curious notion, that to prove that a certain event can happen it need only be made to occur in a novel, is a striking reversion to the primitive custom of securing a result by imitating it. Perhaps this prejudice may survive even the reign of woman; perhaps in some future novel a woman may attempt to prove, by disguising her hero in feminine dress and making him a successful pleader, that man, if he be given a chance, can be as eloquent as his sisters.

Though no modern seriously believes that we can deduce real events from imaginary occurrences in novels, the primitive genuinely believes that events can be produced by imitating them. Practices based upon this belief are so diverse and so universal among primitive peoples, and they persist so obstinately as civilization advances, that the habit of thought they represent, however this may be finally interpreted, is obviously a characteristic part of the structure of the primitive mind. To kill my enemy, argues the primitive, I need only make an image of him in wood or wax or clay and pierce this image with my spear. No doubt, we simplify his thought by speaking simply of an endeavor to secure a result by imitating it. He will probably sing charms, or pray, or annoint his image with magically potent blood or fat; he may even lay a real ambush. Sometimes he seeks divine or spiritual aid to help on his effort. But the central core, imitating an event to make it happen, appears again and again in the records of savage, and even of relatively civilized, practice. Wax models of ships were found in an Egyptian temple. By floating these models in water and making them sink it was supposed that the enemy fleet could be destroyed. Magicians have swung themselves, in many lands, to make the corn grow. Australian savages imitate the life history of the witchetty grub to promote the reproduction of this particular food. Pouring out water occurs in rituals for producing rain. The list of instances, if made complete, would stretch out, like the procession of kings in *Macbeth,* "until the crack of doom."

Dr. Frazer reserves a special term, "imitative magic," for the many and varied rites presenting the common feature of imitating an event to make it happen. Imitation alone is not a sufficient explanation of the mental habit expressed in imitative magic; but the prevalence of practices in which we can easily detect the common element of attempting to produce events by some performance that resembles them, points clearly to a primitive habit of thought that marks a well-defined mental species. Guy Fawkes is still burned in effigy; but no modern would seriously propose, though assisted by an elaborate ritual, to execute a murderer by hanging his proxy.

The primitive mind differs from the civilized in its opinion of the animal. Wundt attempts to divide the development of human thought into four roughly defined stages. In the second or totemic stage men have much concern for their relations with the brutes. They include them in their ancestry, and they include them as members of their tribes or tribal groups. In Australia the ancestor of a tribal group may be a kangaroo, or a snake. "Emu men" class themselves with emus, or emus with themselves. The animals have often the status of senior members of the tribal group in which they are included. Wundt contrasts the totemic estimate of the animal with the civilized estimate by describing it as the exact inverse. The totemist considers the animal his superior: civilized man thinks of it as vastly his inferior. Primitive man must distinguish between the animal and himself: kangaroos, snakes, and all the varied fauna of the earth strike his eye and affect his senses differently from his fellows. But he makes his distinction very differently from his more civilized descendant. The animal may be his fellow-tribesman and may be the progenitor of his tribe. It may be more magically potent, wiser, and more deserving of reverence, than the oldest and wisest of his human kin. An animal may have founded the rites and ceremonies that his tribe performs to maintain its existence. A view of the animal so contrary to every modern idea, whatever be the ultimate causes on which it rests, denotes a difference of mental habit so pronounced that it establishes a veritable separate mental species. By his practice of imitative magic and by his conception of the animal, primitive man is as separated mentally from man to-day as the elephant is biologically separated from the crow.

Strategical position is as important in thought as in military art. Warfare strives both for strategical hold and for strategical vision—strategical hold to concentrate attack on weak or crucial points, strategical vision to observe in full the enemy dispositions. The strategic view-point has the important parallel in thought. To put the right question, to secure the conception that arranges the facts in a significant way, is a primary aim of all inquiry. The philosopher seeks a point of view that will present the whole universe in its most significant aspects; but in all inquiries the human mind must be content to procure as many illuminating view-points as possible.

One survey of the course of human thought on its way from primitive notions of the world to modern ideas is obtained from the concept of "transformation." Many notions converge on, or diverge from, the idea of transformation. This conception, therefore, gives an aeroplane view—displaying currents of thought as a country is spread out before the aviator. The fairy godmother transformed a pumpkin into a coach for Cinderella. The pumpkin had no qualifications for conversion into a coach: it was metamorphosed by fairy magic. For the primitive, transformation is metamorphosis—a conversion of one thing into another that does not depend on any connection between the two objects. The cause of the metamorphosis resides in a force purely external to the object transformed; and anything can, generally speaking, be metamorphosed into any other. Certain stones in the sacred territory of an Australian tribe are believed to metamorphose, at appropriate times and under appropriate conditions, into kangaroos. In the Greek myth, Deucalion and Pyrrha repeopled the world after the flood by the metamorphosis into human beings of stones they threw behind them. Metamorphosis, the transformation of unconnected things into one another, appears persistently in the myths, legends, and folk-tales of the world. The Prince is changed into a beast; Daphne becomes a laurel-tree; Zeus seeks Europa as a bull; Niobe is transformed into a fountain. Metamorphosis between animals and men remains persistently in lower cultures, as the most plausible residue of universal metamorphosis. The werwolf legend, of humans oscillating between the forms of wolves and human beings, is scattered through the world. Witches regularly become cats or hares in folk-tales.

The constant recurrence of metamorphosis in the stories of the world intimates a primitive belief in the possibility of transforming anything into virtually anything else. The metamorphosis is usually associated with some magic force that constrains the transformation. Novels written in the nineteenth century, though they contain fictitious incidents, reveal the writer's estimates of possibility. One author may introduce events regarded by his contemporaries as purely mythical, to constitute an allegory or to amuse. Fairy-tales are still written for children. Swift used the improbable to give edge to the satire of Gulliver. But the literature of any century, taken as a whole, reveals that century's estimate of possibilities. It is possible that the future literature of the twentieth century may reveal clearly that both authors and public believe that the dead may return, that seers can read the future, and even that the sleeper can visit the country he will enter when he dies. If these beliefs become real and widespread estimates of possibility, they will become ordinary items of literature. Metamorphosis is an ordinary item in the early stories of the world, and thus represents a primitive estimate of possibility. The present beliefs of peoples in primitive and lower-grade culture confirm the evidence of literature and tradition. The concepts connected with transformation thus divide the primitive and modern minds into different mental species, just as do the concepts attached to imitative magic and to the relation between man and beast. The study of the concept of transformation provides a particularly favorable opportunity for observing how the beliefs of the primitive develop into the beliefs of modern man.

The human mind begins by supposing that any transformation is possible. As thought advances, the notion of development is substituted for the belief in metamorphosis. Transformation is seen to follow certain paths, and change is seen to depend on the qualifications of the objects that change. Looking down on the course of human thought from the standpoint of the idea of transformation, the concept of arbitrary metamorphosis, under the complete constraint of magical forces external to itself, gradually passes into the realization that things develop from, and into, one another under the regulation of laws. The belief in metamorphosis is replaced, gradually and surely, by the recognition that transformation proceeds along definite routes.

It has been often supposed that we attain to the notion of *cause* by observing series of events that conform to a regular sequence. Thirst disappears after drinking and, since drinking must precede the disappearance of thirst, we think of the drinking as cause and the disappearance of thirst as effect. Hume thought that causes and their effects appear to us to be linked by a necessity because we notice that they constantly occur in succession. When B happens after A has happened and B never takes place without the previous occurrence of A, the belief naturally arises, Hume argued, that A produces B—that there is a necessary causal connection between A and B. The primitive conception of transformation as metamorphosis constrained by a magical force recognizes, however, a *tie* between cause and effect without recognizing the necessity, or even the existence, of uniform sequence. The notion of a tie between causes and their effects is the essential element in the concept of causality. A uniform sequence, as of day and night, may be repeated *ad nauseam* without coming under the adjective "causal." Wolves, tigers, and other beasts roamed through the gardens of Circe's palace. She transformed, by her magic arts, the companions of Odysseus into swine, as she had transformed other unfortunates into other animals. If she had metamorphosed each individual into a different beast she would have exerted causal actions that presented no uniformity of sequence. Or, if the metamorphosis man-into-beast were the sequence repeated, she might have transformed one man, and one man only, into a pig or tiger or other animal; there would still have been causal action though without any repetition of sequences. Uniform sequences need not be causal and causal connections need not be repeated—it is possible to think of repetitions as uncaused and it is quite possible to recognize that one event may cause another on its one and only occurrence in the universe.

One trend of modern thought threatens a curious fate for Hume's argument. Hume argued that uniformity or regularity of succession imposes upon us the notion of necessary connection or causation. Many thinkers now suppose that science is relieved by the existence of uniformities from the necessity of believing in causes. Science, according to their view, has merely to describe the uniformities that occur and formulate their rules. The universe has certain regular habits. Hume's argument that we deduce from regularity to cause is replaced by the notion that regularity only requires a formula or merely a description of the regularities observed.

The gradual recognition that transformations or events proceeded along definite routes did not create the concept of causation. The recognition of causal paths is a modification of the idea of cause and not its originator. The substitution for the idea of the metamorphosis of the seed into the plant of the notion that the one develops according to definite laws into the other, presented the original causal notion in a different aspect. Magical forces, exercised by a powerful magician or operating through prescribed ceremonies, compelled, in the belief of the totemist, the growth of the plant. The causal compulsion is simply differently conceived when it is realized that the qualities of the seed and the favoring influences of soil, warmth, moisture, air, and light conjoin to produce growth. This alteration of conception is one of the most important, if not the most important, truths imposed upon the human mind by experience.

Men must have realized from the first that appropriate means must be used to attain certain ends. The conception of a primitive belief in absolute magical forces that could virtually create any transformation whatever is therefore a limiting conception. Lotze remarks that causes were first appreciated in the workshop. The early stone-workers must have learned the technique of knapping flints. There would be no fire without rubbing together two sticks or twirling a hard point on a soft block or striking a flint. But the primitive mind was dominated by the notion of absolute magical forces that constrained changes and events. Never or seldom, Dr. Frazer points out, do primitive peoples ascribe death to natural causes. The man does not die because a spear pierced his heart but because the thrower or his spear was magically potent. This domination by the magical contrasts sharply with the modern realization that the universe is a complex of causal paths. Slowly and laboriously the causal sequences that determine all events were brought to light. The conviction that the regularity of law ruled over all was gradually established.

The whole complex of causal paths is not yet unraveled. Perhaps it never will be; perhaps the belief in an absolute uniformity is as too absolute in one direction as the primitive belief in absolute magical forces was too absolute in another. Absolute uniformity, rigid determination, is, indeed, perhaps as much a limiting conception when applied to the modern mind as the notion of absolute magical forces is a limiting concept when applied to the primitive consciousness. In neither case does the principle hold *in toto*. The primitive combines some appreciation of defined causal sequences with his dominant notion of unrestricted magical forces (unrestricted except by their own degree of potency), and the modern mind is loth to believe that in the sphere of will, and it may be in nature, there is an absolute reign of law. But two dominant conceptions concerning all transformations and happenings separate the primitive from the modern mind. The primitive mind is dominated by the notion of metamorphosis—by the belief in the operation of magical forces that are unrestricted by causal paths. Magical potency converts life into death, seed into plant, or draws the fire from the stick. Experience slowly but surely replaces the principle of metamorphosis by the principle of orderly passage or development, as causal sequences come to light and force on the mind the recognition that causal action has sequences prescribed for it.

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the Appendix by putting the red colophon ahead of it, and writing the Appendix in smaller letters and paler ink. This is the treatment in the Philadelphia Manuscript of 1116, owned by John P. Bedrosian.

4. The Double Ascription to Mark.

5. The Ascension-tide Lection.

6. The Bible Society's Ending (with a note about the absence of the Appendix in Greek manuscripts, but suppression of the fact that Armenian ones are the star witnesses against it).

7. The Roman Catholic Ending (same as the Bible Society's, but with no note at all). This ending is printed by the Armenian monastery aforesaid under the authority of the Pope. Only later manuscripts end thus.

We now proceed to print these actual Armenian endings, true or false, as translated by me from the originals with the assistance of Frank Normart and Shadrach Adurian, M.A., Anatolia College, Marsovan.

1. *End of Mark* in Armenian manuscripts before 989, and in careful ones down to the fifteenth century.

233 And when they heard, they went out and fled
I from the sepulcher, because they were terrified; and they said nothing to any one, for they feared.

Gospel according to Mark.

(Rubricated colophon, having the force of: *Here endeth* etc.)

Note.—This is the only genuine Old Armenian ending, and *it has never yet been printed in the original,* and only in English in *The Monist* for 1917 and elsewhere in recent years. It is found in the Philadelphia Gospel Manuscript of 1098, owned by John P. Bedrosian (Peters) and in all known manuscripts before 989. ***This means that it took the tenacious Armenians more than a thousand years to*** *corrupt the Holy Gospel,* but the Greeks only three hundred. For the Washington and London Manuscripts, fifth century, are the first to contain the Appendix, while the Armenians were still hesitating to copy it in the fifteenth! (Gospels in one volume, second century; Armenian Version, fourth and fifth.)

2. *End of Mark* in the Etchmiadzin Manuscript of 989.

233 And when they heard, they went out and fled from the sepulcher, because they were terrified; and they said nothing to any one, for they feared.—*Presbyter Ariston's.*

Now, when he was risen early on the first day of the week, he appeared first to Mary Magdalene [etc., as in our current versions. The words, *Presbyter Ariston's,* are crowded in as an afterthought].

3. *End of Mark* in the Peters Manuscript at Philadelphia, A.D. 1116.

(No era given. Should the Armenian Era of 552 be meant, the date would be 1667; but the manuscript appears to be much older.)

233 And when they heard, they went out and fled
I from the sepulcher, because they were terrified; and
they said nothing to any one, for they feared.

Gospel according to Mark.

(Rubricated)

Now, when Jesus was risen early on the first day of the week, he appeared first to Mary Magdalene [etc., as in our current versions].

NOTE.—Conybeare's *Catalogue of Armenian Manuscripts in the British Museum* (1913) shows that many manuscripts end like this after the twelfth century, when the Crusaders began to influence the Armenian Church.

PARACELSUS AS A REFORMER IN MEDICINE.

AS the main interest of Paracelsus (1493-1541) lay in medicine, and as he rejected the ancient authorities on the theory and practice of medicine, it was of first importance to his mission that he should formulate a theory of medicine that should harmonize with his philosophy of nature and the results of his experience and observation. Naturally also his medical theory is closely related to his natural philosophy.

The history of medical science gives ample evidence of a great need of radical reform both in theory and practice at the period of the activity of Paracelsus.

The accepted body of medical doctrines as authorized by the medical faculties and taught in the universities was founded upon the ancient authorities of Hippocrates and Galen and their Arabian interpreters, and particularly of the latter. The Greek physician Galen had indeed accomplished much in his time to advance the practice of medicine, and had even performed dissections, not indeed on the human subject, but upon animal bodies. But to the physicians of the time of Paracelsus the ancient Greek of Galen was almost unknown in its purity—but only as transmitted, commentated, and interpolated through Arabian interpreters — Avicenna, Averrhoës, Mesue, and others. The Galenism of the sixteenth century was a corrupted Galenism, overlaid with Oriental occultism and mysticism. Moreover, the medieval spirit still ruled in the profession.

The teachings of the Arabian-Greek authorities had been for centuries and were still held as infallible dogmas. The doctrines of medical science were a finished book, just as the authorities of the Church were final,—they might be commentated, expounded, interpreted, and taught, but not contradicted nor seriously questioned. No experiments were encouraged, no doctrines or opinions tolerated that might be in evident contradiction to these sacred authorities. Though new diseases had arisen to puzzle the profession, no new unauthorized measures could be attempted to meet them. Naturally enough, while such a condition prevailed the medical profession was bound to degenerate into a self-satisfied caste. Naturally also ignorance and incapacity, fostered by the lifeless teaching of the conventional dogmas, theories, and the stereotyped system of symptoms and remedies, often gave rise to pretentiousness and hypocrisy. It followed also that in the Renaissance, when men were thinking many new thoughts—that there should have arisen a suspicion as to the sufficiency of the medical theory and practice, not perhaps within the ranks of the conventionally trained profession itself—though here and there a voice was raised in protest against some phase or feature of medical practice or theory—but more particularly among laymen, and the general public.

It was indeed during the very time when Paracelsus was acquiring his medical training, that Erasmus in his *Praise of Folly,* satirizing the follies of the time, said of the contemporary medical science, "And indeed the whole art as it is now practised is but one incorporated compound of craft and imposture." Agrippa von Nettesheim, the elder contemporary in Germany of Paracelsus, had also written,[1] "The greatest reputation is attained by those physicians who are recommended by splendid costumes, many rings and jewels, a distant fatherland, tedious travels, a strange religion, especially the Hindu or Mohammedan, and who combine with these a monstrous shamelessness in the praising of their medicines and cures. They observe times and hours most exactly, dispense their medicines always according to the astrological calendar, and hang all kinds of amulets on the patient. Simple and native medicines are quite neglected. Costly foreign remedies are preferred, which latter are mixed in such enormous number that the action of one is counteracted by that of another, so that no human sagacity can foresee the effects which will arise from such an abominable mixture."

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[1] Baas, *Geschichtliche Entwickelung des ärztlichen Standes,* p. 185.

Peter Ramus, the distinguished French humanist and reform professor in the College of France—himself a great admirer of the work and skill of Paracelsus, as shown in an essay urging certain reformations in the University of Paris (in 1562)—emphasized the laziness of the professors of medicine and theology, and complained that the analyzing of herbs and simples and the study of their effects upon the body were totally neglected.[2] The shortcomings of the medical profession were evidently not unappreciated by many able contemporary critics.

The medical theory of the period was based, as already mentioned, upon the doctrines of Hippocrates and Galen. With these Greek physicians, medicine had been indeed a living science, though primitive. They at least had learned by observation and experiment; but their medieval interpreters no longer experimented, and their observations were only such as might enable them to apply the accepted doctrines and formulas of the ancient authorities. The teaching of medicine in the universities at the time of Paracelsus was practically confined to the reading of Avicenna, Mesue, Averrhoës, and other interpreters of the Galenic doctrine, and commentaries and exposition of their meaning by the lecturer. Dissections and laboratory methods were lacking; though sometimes at rare intervals, when permitted by the civil and clerical authorities, demonstrations in anatomy—superficial and crude indeed—were made in the presence of the medical students and the physicians of the town. The first important publication on anatomy, marking the beginnings of the development of modern anatomical studies, was that of Vesalius which appeared in print two years after the death of Paracelsus.

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[2] Cf. Graves, *Peter Ramus and the Educational Reformation of the Sixteenth Century,* Macmillan, 1912.

The authoritative theory of diseases was based upon the Galenic doctrine of the four humors or fluids of the body, phlegm, blood, the yellow and the black bile,—these being related by metaphysical analogy to the four elementary qualities—cold, dry, warm, moist. Any disturbances in the proper proportions of these fluids produced illnesses or disease. The nature of these disturbances was indicated by accepted symptoms. The treatment was directed toward restoring the supposed disturbed balance of qualities as indicated by the symptoms, and consisted generally of bleeding, purging, and the use of decoctions of herbs, generally extremely complex in their admixture. But through Oriental influences this Galenic theory, fantastic and unscientific as it was, had become complicated with astrology and other mysticisms, while the superstitions of the medieval Church, and the heathen superstitions of the northern European peoples, were not without their influence upon local medical practice.

Troels-Lund[3] has interestingly described the prevalent beliefs of the sixteenth century as to the causes and cures of disease. They may be briefly summarized as follows:

First: Disease comes from God by his direct volition as warning or as punishment. The logical conclusion was that God should be permitted to effect the cure. Prayers, penances, and the offices of the Church were thus the natural instrumentalities through which the divine mercy might be invoked to relieve the suffering. Manifestly the skill of the physician had here little place.

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[3] Troels-Lund, *Gesundheit und Krankheit in der Anschauung alter Zeiten.*

Second: Disease comes from the influence of the Devil and his agents. Here again prayer, penances, exorcisms, and purification by the offices of the Church might avail (white magic). So also, however, might magic ceremonies and formulas, and exorcisms by wise women, and magicians, who presumably owed their power to their superior knowledge of the occult powers of nature, or perchance even to unholy alliances with the powers of evil (black magic). Here also there was little room for the skill of the physician, though it might be he could assist;—who could be certain?

Third: Disease comes from the stars. Here evidently the physician might help, who knew the secrets of the heavens, and who gathered and prepared his remedies at the auspicious time and could administer them when the planets were favorable.

Fourth: Disease comes from the disturbances in the fluids or humors of the body. This was the Galenic doctrine above mentioned.

A fifth general idea as to the cause of disease mentioned by Troels-Lund, may have been but an elaboration of the fourth, viz., that disease was owing to something lacking in the body which medicine could supply to restore as it were the equilibrium, and with this idea there was developed a body of *materia medica* during the sixteenth century which presented an astonishing catalog of often almost incredible and repulsive remedies.

To this question as to the causes of disease Paracelsus, in his desire to replace the ancient authorities by something more in accordance with his own philosophy of nature, applied himself with characteristic originality, and with some intuitive insight.

He catalogs and describes five "entities" which influence the health of man. These entities or influences are the *ens astrale,* or sidereal influence; the *ens veneni,* or influence of poisons; the *ens naturale,* or influence which exists in the nature of the individual, the microcosm; the *ens spirituale,* influences acting not directly upon the body but through the spirit (*Geist*); the *ens deale*—the will of God acting directly to produce illness by way of warning or punishment.

With respect to the first of these, the *ens astrale,* he recognizes the influence of the stars without admitting their control of the destinies of man, and he makes a curious attempt to explain their influence by the hypothesis of a kind of effluvia conveyed from the stars through the atmosphere.

His treatment of the second influence, the *ens veneni,* is of interest as illustrating both his comprehension of an important physiological fact, and his fanciful and imaginative elaboration of it into theory. "The body was given us without poison, and there is no poison in it; but that which we must give the body for its food contains poison."[4] He elaborates this idea by explaining that the plant and animal food which we eat contain both useful and useless material, wholesome and unwholesome, food and poison. In the body the food and the poison must be separated, the food being transformed into flesh and blood and bone, etc., the poisons eliminated. This separation, he considers, is effected by the "Archæus," a directing force or spirit. The Archæus, situated in the stomach, sorts out and separates the wholesome from the unwholesome in the food. So long as the Archæus performs his functions properly our food is wholesome and the body thrives. Should from any cause the Archæus become ill or incapacitated the separation is incomplete, and we suffer from the poisons being imperfectly eliminated. The Archæus is, then, says Paracelsus, an alchemist, for his functions are similar to those of the chemist in his laboratory. Other animals have their "Archæi," and their functions vary in degree from those of man.

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[4] Paracelsus, *op. fol.* (Strassburg, 1616-18), I, 9, "Paramirum."—Quotations in this article are translations by the writer from the original (German) texts.

"The peacock eats snakes, lizards, stellions; these are animals which in themselves are perfect and healthy, though to the needs of other animals sheer poison, but not to the peacock. For from whatever reasons it may be, his alchemist is so subtle that the alchemist of no other animal equals him, who so cleverly separates the poison from the good, in that which the peacock eats without injury.

"Observe, then, that every animal has food adapted to it and which has been ordained for it by its alchemist who separates the proper materials. To the ostrich there is given an alchemist who separates iron," etc.[5]

In everything there is an essence and a poison; an essence is that which preserves man, a poison that which produces illness.

It is difficult to say to what extent Paracelsus believed that this presiding Archæus was a true spirit having an individuality or personality of its own, to what extent a term to typify a force or principle. It is interesting to note that in the Latin text of his work *De gradibus* (1526), published by Huser after the manuscript of the pupil and amanuensis of Paracelsus, Oporinus, the following definition appears: "Archaeus est ista vis quae produxit res, id est dispensator et compositor omnium rerum." The word *vis*, or "force," is here noteworthy, though not necessarily a demonstration of the exact notion possessed by Paracelsus himself.

To the philosophy of the neo-Platonists of the sixteenth century, however, the notions of force and principle and spirit were more closely connected, for as God was the soul of the universe, and as man—the microcosm—possesses a soul, so also all other parts of the macrocosm had souls or spirits. Or, as expressed by Agrippa von Nettesheim,[6] "It would be absurd if the heavens, the stars, and the elements, which are for all beings the sources of life and soul, should themselves lack these,—if every plant and every tree had part in a nobler destiny than the stars and the elements which are their natural begetters."

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[5] *Op. fol.*, I, 10, "Paramirum." This is an ancient fable that the ostrich can eat iron.

The description of the third influence, the *ens naturale,* or the influences dependent upon the nature of the individual, is more complicated. For man, the microcosm, was the epitome of the macrocosm, and in his nature were to be found in a sense the counterparts of all external influences. As in the external universe, the sun, moon, and planets have their predestined and determined courses, so the microcosm has its sun, moon, and planets with their predestined courses. As the heavenly bodies could exert some influence on the health and diseases of men, so the corresponding planets of the human organism may have similar influences. Thus, as the sun by its light and heat influences all living things, so the heart, the sun of the body, has its determined course and gives light and warmth to the body. To the moon and its influences corresponds the brain in man; similarly, the lungs correspond to Mercury, the liver to Jupiter, the kidneys to Venus, the gall to Mars, etc. Thus the planets have their analogies in the body, and each has its established course and influence, its conjunctions and appositions. These courses are, according to Paracelsus, foreordained at birth, and the time is set for their life and activities, as an hourglass is set for a determined time. "For example, a child is born at a certain hour, and is to live according to his *ens naturale* for ten

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[6] As cited by Cassirer, *Das Erkenntnisproblem,* I, 193.

He explains how these spirits may be created by the will of man when he thinks of another person, in waking or in sleeping hours—and the spirits thus engendered may attack the spirits of the person thus selected, and do injury to them and through them to their possessor. On the other hand, the spirit thus assailed may successfully resist and prevail over the attacking spirit, in which case the originator himself may be the sufferer.

In the discussion of this topic Paracelsus manifestly realizes that he is liable to come into dangerous conflict with the Church doctrines, if misunderstood, and warns his readers that they "lay aside the style which is called theological. For not everything is sacred which is called theological, and not everything is holy which theology employs. Also all is not true which he uses who does not understand theology aright. Though the theologians describe this *ens* most forcefully, though not under the name and text of our fourth 'Pagoyum'(?), they also deny what we maintain."[9]

This curious attempt to explain the mechanism of the then generally credited occult influence of one person upon another by magic or charms or witchcraft or the evil eye seems strangely foreign to our modern thought, but it is well to remember that such representative thinkers of that time and of later times—as Trithemius, Pico della Mirandola, Agrippa, Melanchthon, Cardanus, and Giordano Bruno, were all believers and writers or lecturers upon magical influences.

In the *ens deale* Paracelsus recognizes the influence of the will of God upon the health of men, but instead of accepting the inference that through the offices of the Church is help alone to be obtained, he emphasizes the idea that God has created the system of nature and that He prefers to work through nature rather than by direct inter-

[9] *Ibid.*

ference. The true physician, therefore, is he who understands the phenomena of nature, and is through that knowledge the agent through whom God acts. This point of view is a dominating thought with Paracelsus and is brought forward continually in many of his works. As God may send illness so he sends the physician at the proper time when the period of punishment is completed, for naturally only then may the cure be effected.

"When He performs a miracle, He performs it humanly and through mankind; if He effects wonderful cures, He does that through men, and therefore the physician."[10]

He admits that there may be two kinds of physicians, those that heal through the faith, and those who heal through their skill in medicine. Not all have sufficiently strong faith, but the end of the period of punishment having arrived, the physician may cure through the art of medicine. Curing by the power of the Christian faith, he explains, moreover cannot apply to the heathen—Turks, Saracens, Jews, etc., but asserts that he teaches the foundations of medicine not only for Christians but for all others as well.

"The physician is the servant of Nature, and God is the master of Nature."[11]

"But that you may know what the reasons are that God has created medicine and the physician because He is the physician, and yet works through the physician and does not Himself act without a physician, understand this explanation, that such is His mystery that He does not will that the sick shall know that God is the physician, but that the art may have a procedure and a practice, and that man shall not perceive His help in miracles alone, that is, in God Himself, but also in His creatures that they may help through the artist in medicine, and that according to His predestination in its proper time."[12]

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[10] *Ibid.*, I, 21c.

[11] *Ibid.*, I, 22.

"So know then all, that we human beings are born naked and bare, and bring with us neither knowledge nor wisdom, but await the grace of God whatever He may send us. And He gives us nothing as a free gift but life. Whether we be well or sick, that He commands through nature; teaching us to speak, that He ordains through our parents; and so on as we grow up, we must learn all things with labor and difficulty, for we possess not the least knowledge. As, then, we must learn, there must be something which is not human that teaches us. For man at first can do nothing. If we then wish to learn, our first foundation is in God, that we acknowledge Him as our God who teaches us and sends us what is needful. And if we consider all things well we find that all things take place through an instrumentality which God has provided at the creation. Thus God the Father, when He created the heavens and the earth, created them to be an instrumentality through which that should come to us over which our bodies should rule. Thus is man the master of medicine, of the fields, the meadows, and the vineyards."[13]

This formal cataloging and characterization of the five *entia* which influence the health of man, by no means adequately present the whole theory of disease entertained by Paracelsus. He also characterizes disease itself as an organism. Troels-Lund well summarizes his theory as follows: "It is not, as the Arabians accepted, something only negative in relation to positive health. It is itself something positive. It is a form of life of its own, a parasite organism, a microcosm. Man is in illness of two natures, has at the same time two bodies in one and the same. To understand this rightly we must make it clear what that is we call life. Life is always an intimate union of three constituents: salt, sulphur, mercury. So long as life lasts they form an intimate union and are not noticed. But if they begin to separate and to become separately noticeable in pains and burnings, this is disease and it may lead to complete separation: to death. Life is something invisible while its elements are kept together. If life ceases they separate and become visible. You do not understand this? Try it. A tree lives. Cut it into firewood and it dies. When you now burn it, that which burns is sulphur, that which vaporizes is mercury, and that which is ashes is salt. There is nothing more in it. All these three, the combustible, the volatile, the insoluble, are found united in everything living and are separated only when it dies. These three it is which we characterize by the names of sulphur, mercury, salt."[14]

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[12] *Ibid.*, I, 22-23.

[13] *Ibid.*, I, 113.

"Disease is a conflict between two invisible forms of life—disease and health, which are both harbored in the same organism. The conflict is carried on everywhere in the body; is felt as heat, cold, discomfort, pain in all regions. The fever, the pain, are not the disease but only expressions of the force, the form, under which the nature of the organism, the inner alchemist or archæus, or whatever you choose to call the living force within you, seeks to put to flight the disease. The main battle consists in the crisis. If the 'archæus' wins, the disease must dissolve—give way, and be expelled as perspiration, excreta, respiration. If the disease conquers, the organism is dissolved in death."[15]

"Disease itself he viewed as a half spiritual, half corporeal living organism, as a microcosm within the microcosm, as a kind of parasite—with its own life phenomena and life processes within the human organism; its healing takes place when nature or medical art succeeds in developing so forceful a vital activity that the parasite is suffocated, that is, the disease is overcome."[16]

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[14] Troels-Lund, *op. cit.*, pp. 156-7.

[15] *Ibid.*, p. 159.

Another and more modern phase of thought which is much emphasized by Paracelsus is the curative power which lies in nature herself, independent of all medical assistance.

"That you may understand what it is that heals wounds, for without that knowledge you may not readily recognize the remedy, you must know that the nature of the flesh, of the body, the veins, the bones, has in it an innate balsam (*mumia*) which heals wounds, thrusts, and such like things. That is to say, the balsam lying in the bone heals the fracture, the balsam naturally contained in the flesh heals the flesh. So with every member, it must be understood, each has its healing in itself and thus nature has in every member that which heals the wounded part. Therefore the surgeon should know that it is not he that heals, but the balsam in the body. If the physician thinks it is he that heals he deceives himself and does not understand his art. But that you may know for what purpose you, the surgeon, exist, learn that it is to provide a shield and protection to nature in the injured part against enemies, so that these external foes may not retard, poison, nor spoil the balsam of nature, but that it may remain in its balsamic power and influence by the maintenance of such protection. Therefore he who can protect and take good care of the wounds is a good surgeon."[17]

"In nature's battle against disease the physician is but the helper, who furnishes nature with weapons, the apothecary is but the smith who forges them. The business of the physician is therefore to give to nature what she needs for her battle.... Nature is the physician."[18]

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[16] R. Julius Hartmann, *Theophrast von Hohenheim*, 1904, p. 90.

[17] Paracelsus, *Chir. Bücher* (1618), "Grosse Wundartzney," p. 2.

[18] *Ibid.*, p. 207.

These medical theories of Paracelsus were extremely heretical in the eyes of the medical profession of the time. It was not possible for him to have publicly maintained his theories without exciting the opposition of the medical faculties and practitioners. Least of all was that possible in the universities which were the very strongholds of conservatism.

The practice of his profession differed as decidedly as did his theories from the conventional methods of diagnosis and treatment. Having broken with the teachings of the ancient authorities, the young physician had not hesitated to learn from all sources which were open to him in his travels in his own and in foreign lands and his sojourning among all classes of people, the remedies and treatments used by all kinds of healers and the homely remedies in use among the common people. His chemical knowledge and his chemical theories of the nature of vegetable or mineral substances in their relation to the nature of man doubtless suggested new ideas, and these he tested by observation and experience. To what extent these new methods were original with him, and to what extent accumulated during his wanderings in foreign lands or among the villages of Germany or Switzerland, it is not possible to state. Certain it is that many of the remedies and treatments he used and taught were new to the medical literature of his time. The complex syrups and decoctions of rare and costly herbs he rejected, and taught instead that the true aim of chemist and physician was to separate from medicinal raw materials their effective principle, spirits, or *arcana* by the application of chemical processes. In this line of work he set the example of using, instead of the complicated and irrational mixtures of the medieval pharmacopœia, simpler extracts and purer medicinal preparations, both mineral and vegetable.

Whatever be the final judgment as to the relative importance of Paracelsus in the up-building of medical science and practice, it must be recognized that he entered upon his mission with the zeal and the self-assurance of one who believes himself inspired with a great truth, and destined to effect a great advance in the science and practice of medicine. By nature he was a keen and open-minded observer of whatever came under his observation, though probably also not a very critical analyst of the observed phenomena. He was evidently an unusually self-reliant and independent thinker, though the degree of originality in his thought may be a matter of legitimate differences of opinion. Certainly once having from whatever combination of influences made up his mind to reject the sacredness of the authority of Aristotle, Galen, and Avicenna, and having found what to his mind was a satisfactory substitute for the ancient dogmas in his own modification of the neo-Platonic philosophy, he did not hesitate to burn his ships behind him, and cut loose from the dominant Galenism of his time, and to preach and teach that the basis of the medical science of the future should be the study of nature, observation of the patient, experiment, and experience, and not the infallible dogmas of authors long dead.

As we follow the story of the lifelong struggle of Paracelsus against the centuries-old conservatism opposed to him, it is impossible not to feel great sympathy not only for the cause for which he labored but also for the self-sacrificing devotion and tremendous earnestness which he brought to his work.

We can realize now at this distance that the condition of medical science and teaching was in his day at a very low ebb. Improvement was indeed hopeless so long as dogmas held as infallible inhibited all initiative toward rational criticism or new experiment. We can see that the insistence of Paracelsus upon the study of the patients and their diseases rather than of ancient books, his emphasis upon the value of experiments, upon the application of chemistry to the understanding of physiology and pharmacology, his own radical innovations in the use of new and unauthorized remedies, and his denunciations of the hollowness of much of the medical practice and teaching of his time—that these were all working in the direction of progress.

Realizing this we can make allowance for his crudities, his limited understanding of the goal toward which his labors tended, his superstitions, his pseudo-science. We can sympathize with this lonely figure battling throughout his life to break the chains which held medical science enslaved, seeing the path which must be followed to build that science upon surer foundations—yet himself too much hampered by the medieval point of view, too little versed in the methods of modern science to clearly lead the way toward the goal he struggled to attain.

But though we recognize the importance of the work of Paracelsus, while we admire the earnestness and essential sincerity of his reform campaign, we should be unfair to his opponents of the conservative school of medicine, if we failed to recognize the shortcomings of Paracelsus which were in part responsible for the lack of appreciation and of following which he could command during his life. Modern historians of medicine, while recognizing the importance and the essential sincerity of the work of Paracelsus, have not been blind to these shortcomings.

Dr. Jos. Bauer[19] summarizes the reform influence of Paracelsus thus:

"In order to infuse new life into the sluggish and torpid mass of science, there was needed a giant spirit, who with strong hand, regardless of authority and dogma, should seize the reins, and undisturbed by the judgment of his time should understand how to sweep away the accumulated dross. All these qualities the reformer Hohenheim possessed in the highest degree, and he ennobled these gifts by an unselfish honest spirit though his inclination to extravagances drove him into a fanaticism which amounted to a complete autocracy in the domain of opinions. In order to maintain these he trod underfoot the bounds of propriety and in that way alienated the sympathy of calm thinkers."

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[19] *Geschichte der Aderlässe,* 1870, p. 146.

The medical system of Paracelsus was not adapted, in Dr. Bauer's opinion, to influence the physicians of his time, and his ideas were carried forward by a relatively small number of followers—often visionaries, and whose extravagances often did much to discredit his thought. So also Häser,[20] while acknowledging the great value of the services of Paracelsus to medicine, the purity of his enthusiasm and his earnestness, nevertheless recognizes that the methods he used to attain his aims in the science were mistaken.

"This contempt for the foundation of scientific medicine," says Häser, referring to Paracelsus's sweeping rejection of the importance of anatomy as a foundation of medicine, "is in all times the symbol of all transcendental as well as of all empirical systems.... With Paracelsus this undervaluation goes so far that he only uses the word 'anatomy' to denote that which in his opinion should form the foundation of medicine, the knowledge of the nature of life."[21] "Above all he manifests the strong love of freedom native to the German and Swiss stock. 'No one can be another's who can be his own.' This native self-consciousness was as with Luther, with whom he had much in common that is good, and with John Brown, with whom he had much in common that is bad, nourished by the fact that he was lowly in origin, was born and lived in poverty, and that a rude bringing-up separated him from the finer manners of the cultivated classes. The neglect and slight which he experienced insulted his pride and drove him back into himself. By blameworthy or unblameworthy misfortunes he arrived at that arrogant disdain so peculiar to strong but unbending natures, through premeditated contempt for the great accomplishments of his contemporaries to overestimate his own power and his own accomplishments."[22]

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[20] *Lehrbuch der Geschichte der Medizin*, Jena, 1882.

[21] *Op. cit.*, p. 91.

One of the later writers upon the place of Paracelsus in the history of medicine, Dr. Hugo Magnus,[23] after commenting upon the condition of medical science of the time for which the dictum attributed to Rhazes might well have served as a motto, "The study of a thousand books is more important for the physician than seeing a thousand patients," says, "That our hero soon felt the lamentable condition of his science gives very certain evidence of a sound and lively critical sense in matters medical. And that he soon gave expression to this dissatisfaction in powerful attacks upon the corrupt conditions must ensure him at all events our sympathy. This fact alone, that Theophrastus Bombastus declared war to the knife upon the scholastic degenerate medicine, will assure him our gratitude and an honorable place in the history of the healing art."

Dr. Magnus emphasizes that Paracelsus was himself nevertheless possessed of a medieval point of view, that he attacked his problems and mission not by modern scientific methods but with the same kind of reasoning as was used by nearly all his predecessors and contemporaries, only he discarded the conventional medievalism and sought to substitute a similarly unreal and fantastic natural philosophy of his own based upon neo-Platonism.

"For Theophrastus invented no new weapons but sought to achieve the highest knowledge with just the same equipment which mankind had used up to his time. He thought to discover the secrets of life, of existence and growth, by bold fantastic speculations, just as nearly all natural philosophers and physicians up to his time had hoped to do. So he stands, an embodiment of the conflict which rationalism has waged over the knowledge of nature, at the threshold of the new age—that age which attempts to tear from life its secrets not by speculation, but by observation, investigation, and experiment. Vesalius set himself to the task to bring this new era into the world as Paracelsus, the last romanticist in the struggle over the riddle of life, lowered his blunted weapons and, poor in knowledge, closed forever his tired eyes."

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[22] *Ibid.*, p. 87.

[23] *Paracelsus, der Ueberarzt,* Breslau, 1906.

In these estimates of not inappreciative nor unfriendly authorities, we may understand why it was that during his lifetime, Paracelsus seemed to have so little support among the physicians of his day. It is not perhaps too much to say that the doctrines which he asserted and opposed to the accepted dogmatic medicine owed much of their present interest to certain truths contained in them which were rather intuitively apprehended than clearly conceived by Paracelsus himself. As knowledge grew and facts developed, these foreshadowings which the vision of the Swiss physician perceived rather than demonstrated, gained in authority and respect. It required a later experience to comprehend how much of brilliant suggestion, and prevision of the future methods of science were contained in the thought of Paracelsus.

So while we accord Paracelsus our full sympathy in his unequal battle, we should not misjudge nor too severely condemn the conservative profession of his day, that they did not recognize in him a true prophet of medical progress, but rejected him as a dangerous heretic and mischievous agitator.

Nor, on the other hand, need we be surprised that his native force, eloquence, and the logic and reasonableness of much of his teaching—indeed perhaps even the very imaginative and mystical philosophy by which he sought to formulate his theories of medicine—should have had a gradually increasing influence, so that in spite of the fact that during his lifetime he had few friends and supporters, yet after his death, and as his many writings found their way into print, his work laid the foundation for a very material victory for many of the aims for which he had fought.

Especially it should not be forgotten that, though he seemed to struggle in vain against overwhelming odds during his lifetime—that nevertheless he was largely, if not indeed mainly, instrumental in shattering the confidence of a coming generation in the sacredness and sufficiency of the ancient Greek and Arabian authorities. The remarkable vogue which his writings enjoyed when they were finally printed—the violent conflicts that arose in the profession over the theories and practice he advanced, and which resulted in many victories for the Paracelsan adherents even in the universities, the strongholds of medical conservatism: all evidence that there was great vitality and influence in the ideas of Paracelsus.

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INDEFINABLES AND INDEMONSTRABLES IN MATHEMATICS AND THEOLOGY.

I.

IT is a platitude to say that we can neither define every object nor prove every proposition. But the platitude becomes a somewhat interesting truth if we do not use the phrase merely to remind our hearers of the variable character of the objects known to the world of sense, and the limitations of our experience or sparseness of such records as seem necessary to establish the existence of an occurrence in the past.

Even in the domain of logic we need what Peano has called "primitive ideas" and "primitive propositions". In fact, since all definitions of terms are effected by means of other terms, every system of definitions which is not circular must start from a certain apparatus of undefined terms. It is to some extent optional what ideas we take as undefined. Thus, the idea c may be definable in terms of the ideas a and b, or b may be definable in terms of a and c; and thus it is allowable to take either a and b or a and c as primitive ideas. Naturally, of two systems of primitive ideas from which the same propositions can be deduced, that system with the least number of primitive ideas would be chosen for logical—though possibly not for pedagogical—purposes. Further, if we wish to make all our assumptions explicit, and to effect the deduction of all our other propositions from these assumptions, it is obvious that the first assumptions which we need are those that are required to make deduction possible. A proposition can only be proved by means of other propositions. Deduction, then, can only begin by a stating and assuming the truth of the necessary primitive propositions, "explaining" them if necessary. Sometimes their truth is so evident that "explanation" is superfluous, and we at once understand—or at least think we do—though we cannot prove them. We may also "explain" the primitive ideas. The process of "explanation" is psychological: we call up an idea in the mind of the reader by a process which contains the idea to be explained. If this process of explanation of primitive ideas professed to be part of logic, it would of course be objectionable. But it does not: this "explanation" is merely a stimulation of the mind with the object of rousing it to see the idea in question.[1]

As regards the self-evidence of the primitive propositions, "the chief reason," say Dr. Whitehead and Mr. Russell,[2] "in favor of any theory on the principles of mathematics.....must lie in the fact that the theory in question enables us to deduce ordinary mathematics. In mathematics, the greatest degree of self-evidence is usually not to be found quite at the beginning, but at some later point; hence the early deductions, until they reach this point, give reasons rather for believing the premises because true consequences follow from them, than for believing the consequences because they follow from the premises."

Ernst Schröder[3] called the collection of the primitive ideas and primitive propositions of logic the "faith of the logician" (*das Glauben des Logikers*). But, though at first sight there seems to be much in common with the "deposit of faith" mentioned below, we must remember that the appearance of dogmatism in the logician's procedure is deceptive, since all reasoning without exception assumes some at least of the primitive premises. We may doubt the principles by which we infer, but obviously we cannot make any inference from our doubt. The question as to which principles it is possible to drop for certain classes of deductions has not yet been thoroughly treated. In general, it does not yet seem possible to say more than that some axioms or indemonstrable principles are used very much less than others, so that a refusal to use the former would hardly be noticed by the non-observant.

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[1] Cf., for the foregoing, A. N. Whitehead and B. Russell, *Principia Mathematica*, Vol. I, Cambridge, 1910, pp. 94, 95.

[2] *Ibid.*, pp. v-vi.

[3] *Vorlesungen über die Algebra der Logik*, Vol. I, Leipsic, 1890. p. 8.

The principles have been actually formulated, more or less explicitly, and in very different ways, in large parts of arithmetic, geometry, mathematical analysis, and logic, by Leibniz, Frege, Dedekind, Pasch, Peano and his school, Hilbert and his school, Russell, Whitehead, Huntington, Veblen, and others; and many people have considered that the existence of indefinable ideas and indemonstrable propositions in various branches of science is a hopeful sign for theology. Indeed, they think, if theology is reproached by some sceptic for dealing with undefined ideas and unproved or unprovable propositions, it can retort by pointing to what all admit to be the most securely founded sciences of all. "These sciences have now," it would say, "grown up to the stage of frank admission that they rest on a basis of indefinables and indemonstrables; why then urge an alleged insecurity of such a basis against theology?"

Such a thesis seems to have prompted a recent article by Mr. C. W. Cobb on "Certainty in Mathematics and in Theology."[4] But one somewhat important point appears to be overlooked in such a contention. Whereas the whole of mathematics can be deduced from a small number of primitive ideas and propositions which are necessary for the subsistence of any reasoning at all, it seems that the most interesting part of theology consists entirely of indefinable ideas and of—at least deductively—indemonstrable propositions which are none of them necessary for reasoning.

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[4] *Hibbert Journal*, Vol. XII, pp. 404-408.

If we admit that there are such things as human beings, that most human beings are not Christians, and that most human beings have some redeeming feature, we can deduce by pure logic—modern logic, not the traditional logic of Aristotle—that at least one non-Christian has some redeeming feature. But such propositions of controversial theology are not of very great interest. The propositions of controversial and other theology which are of interest are such propositions as that the Pope is infallible, that sinless but unbaptized children are saved—or damned, as the case may be—that the Bible was inspired by God, that the Bible's authority is derived from that of the Church, and so on. Now, none of such propositions seem capable of logical deduction from others. In modern logic, indeed, we say that a false proposition "implies" any proposition, true or false, and that a true proposition "implies" any other true proposition. From this it would follow that, if we knew that, in certain well-defined circumstances, "The Pope is infallible" expresses a true proposition, it would be "implied" both by the proposition that the Bible was inspired by God and that it was not, that Socrates died of drinking hemlock and that Socrates died of old age, or by both that twice two are four and that twice two are five. But the logicians do not mean by "logical implication" what ordinary people do, and what ordinary people mean by it seems to be: "Deducible by logical rules from the premises." It is true that we have some reason to believe that these two definitions of "implication" come to the same thing. Thus Dr. X, a renowned philosopher, once doubted that $2+2=5$ implied that he was the Pope. A distinguished mathematician at once retorted that, since

$2+2=4$, the premise showed that 5 would be equal to 4, and hence that 2 would be equal to 1. Thus, since X and the Pope are two, they are one. But, unless we *assume* a knowledge of the truth of theological propositions and use the word "implication" in the technical and somewhat paradoxical sense of the logicians, we shall not find, I think, that any important theological proposition implies any other.

II.

Theology, indeed, in so far as it is not ethnology or psychology, would seem to employ logical deduction very little, and to consist of propositions which either describe alleged physical facts or are deductions—not logical, but such as "common sense" draws, in its usual manner, at one time happily and at another unhappily, but often fallaciously, from these facts. Of course, logical rules are used in ordinary conversation. I have heard, with a shock of surprise, some one who had not the remotest idea of what logic is concerned with, apply one of what are known as "De Morgan's rules" with great facility. "Mr. Jones won't believe that Miss Smith is a lady-cricketer!" exclaimed this lively person, "so I suppose that either he won't believe she is a lady, or he won't believe that she is a cricketer!" Still, there is a great difference in the extent to which logic is used in, say, mathematics and that in ordinary conversation.

Logic is the structure in which all our scientific or philosophical knowledge is stored in a readily accessible manner. But the storehouse used for knowledge of the world and of God is very small considering the wealth of information supposed to be stored away. One of the most important functions of logic is to provide a means for arranging our great possessions in facts of nature, for putting these facts in order. We may be possessed of a mass of valuable papers, but their value is very greatly diminished if they are not arranged according to some easily remembered system; so that we can find any particular paper as easily as we can find, from a knowledge of its number, the house of a friend in an unknown street. If our knowledge of the facts of nature were unsystematized, we might accumulate a very large number of measurements of the corresponding pressures and volumes of a gas at a constant temperature; but Boyle's law makes—or rather would make if it were quite accurate, instead of being merely a good approximation—a unity of all these isolated results. It is evident, by the way, that such a systematization also serves the purpose of lightening the load that memory has to carry, that it "economizes thought," as Mach puts it; but this important function of systematization is outside our present purpose.

III.

It is a very common custom to attribute strict logical concatenation to the doctrines of the Roman Catholic Church:

> "First cut the liquefaction, what comes next
> But Fichte's clever cut at God himself?"

"No definition of doctrine uttered by the divine Voice of the Church on earth," says Mgr. R. H. Benson,[5] "is in any sense whatever an addition to the original deposit of truth committed to her at the beginning; no *apparent* modification or correction made by the same authority is a withdrawal of any definition previously made; both are alike nothing more or less than a more exact form of statement of the unchangeable Creed of the Church."

Let us investigate, by way of an example, the premises on which the claim for Papal Infallibility is based. We must remember that "the teaching of faith which God has revealed has not been given like a philosophical discovery, to be perfected by human wit; but has been delivered as a divine deposit to the Spouse of Christ, to be faithfully kept and infallibly declared. And it is on account of this that that meaning of the sacred dogmas is perpetually to be retained which our holy Mother the Church has once declared; and that sense is never to be departed from, under the name of a deeper understanding of them."[6] Again: "It is utterly stupid both pyschologically and historically to suggest that when an article is announced explicitly in a creed it is therefore *a new belief*, while, of course, I admit that it is a new *necessary* belief."[7]

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[5] Preface to H. B. Coxon's *Roman Catholicism: An Explanation of Catholic Belief Taken from Official Sources.* No. 32 of "The People's Books," p. v.

All this makes it quite clear that the Roman Catholic Church merely professes to extract and make more definite ("to define") for the needs of the time being the implications of this "deposit of faith." Unless "faith"—besides being "a supernatural virtue, whereby, through the inspiration and help of God's grace, we believe the things revealed by Him to be true, not because the natural light of reason perceives their intrinsic truth, but for the sake of the authority of God Himself who reveals them, who can neither be deceived nor deceive,"[8]—is also a method for drawing necessary conclusions which has hitherto been unrecognized by logic, no intelligent person can admit any justification for the process by which the dogma of Papal Infallibility is distilled from what seems to be a promise which is half a rebuke given by Jesus Christ to Peter.

After repeating that "the Holy Spirit was not promised to the successors of Peter, that by his revelation they might declare new doctrine, but that through his assistance they might preserve holily and expound faithfully the revelation or deposit of faith delivered through the Apostles,"[9] the Vatican Council of 1870 proceeds to reason as follows:[10]

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[6] Coxon, *op. cit.*, p. 29. This is quoted from an official source.

[7] *Ibid.*, p. 18.

[8] *Ibid.*, p. 23. This, again, is quoted from official sources.

"Their apostolic teaching the venerable Fathers have embraced and the holy orthodox Doctors have venerated and followed; fully conscious that this See of Saint Peter remains ever free from all error, according to the divine promise of our Lord and Saviour made to the prince of all His Disciples: I have prayed for thee that thy faith fail not; and thou being once converted, confirm thy brethren. Hence this blessing of truth and unwavering faith was divinely conferred upon Peter and his successors in this Chair, that they might carry out their lofty office for the salvation of all. . . ."

IV.

It is relevant to quote the context[11] of the remark to Peter which has just been mentioned. I quote from the Revised Version.

"Simon, Simon, behold, Satan asked to have you [i. e., the Disciples] that he might sift you as wheat: but I made supplication for thee [i. e., Peter] that thy faith fail not: and do thou, when once thou hast turned again, stablish thy brethren. And he said unto him, Lord, with thee I am ready to go both to prison and to death. And he said, I tell thee, Peter, the cock shall not crow this day, until thou shalt thrice deny that thou knowest me."

Accordingly, Peter clearly considered that he was affirming a class of true propositions of the form: "My faith is *now* so firm that. . . .," the "now" being the then present or any future instant; whereas Christ had asserted that at one or more instants in the past, present, or future, Peter's faith was or would be only firm in virtue of the above prayer. Christ thereupon retorted that Peter's faith would fail at a certain future time. All four Evangelists are careful to record both the prediction of Peter's denial and the actual denial, but only Luke records any remark of Christ's about prayers that Peter's faith should not fail.[12] It seems, then, just to conclude that Peter's denial and Christ's foreknowledge of it are at least as certain as Christ's remark that he had prayed that Peter's faith should not fail. Now, a denial involving the shrinking from a possible martyr's death for the sake of trust in the divinity of Christ, was clearly considered by both Peter and Christ as a failure of faith. Thus it is not relevant to say (if anybody should wish to say it—which does not seem very probable) that "failure of faith" does not mean any such human weakness as lying to save one's liberty or life, because of a lack of confidence in somebody else's pretensions; but an inability to perceive the truth of the principles or methods of deduction of Christianity. For, in that case, Christ's prophecy would be quite irrelevant to his "promise" to Peter—a statement of what had happened or was to happen (past and possible future failures of faith but for Christ's prayers) put in the form of a rebuke.

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[9] *Ibid.*, pp. 73-74.

[10] *Ibid.*, pp. 74-75.

[11] Luke, xxii. 31-34.

No Roman Catholic, I imagine, would admit that Jesus Christ's prayers were ever ungranted, so this apparently reasonable way of escape is cut off for him. Consequently, he must hold—though he would not, of course, state this belief explicitly—that Christ, when he prayed that Peter's faith should not fail, excluded those future instances (if there were more than one) where it was to fail. That there were to be no such instances after the Ascension, when Peter was presumably left as head of the Church on earth, is nowhere stated, and is not logically deducible from the proposition that at some instants Peter's faith was not to fail. The extension of the freedom from error to Peter's successors again requires some other than a merely logical principle for its deduction from the "deposit of faith."

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[12] It may also be noticed that Matthew (xvi. 18-20) is the only Evangelist who gives the alleged remark of Christ's about Peter, the rock, the Church, and the power given to the Church, which, as everybody knows (cf. also Coxon, *op. cit.*, pp. 66, 72), is a very important part of the foundation of the Roman Catholic Church. We are forced to conclude that a very important part of the Roman Catholic dogma logically depends on the supposition that Christ punned on the name "Cephas," and that Matthew or the unknown author of "Q" translated Christ's pun. (Cf. Hastings' *Dictionary of the Bible*, p. 759.)

So long as Peter's faith did not fail—which we will assume, for the sake of argument, was always the case until the denial—we may hold that Christ's prayer was certainly granted, and we may even hold, it seems, that Peter's faith would have failed if Christ had not prayed. But, the moment that we extend the space of time forward, so as to include at least one moment when Peter's faith did, in fact, fail, we must conclude that Christ's prayer could be reduced to the prayer that Peter's faith should not fail except when it should happen to do so. Now, we cannot suppose that Christ supplicated for what would happen, by logical necessity, whether God existed or not; so we are driven to the assumption, if we wish to hold that Peter's faith remained firm after, say, the Ascension, that Christ's prayer excepted, by defining them, the occasions of failure. Hence, to prove that Peter's faith did not fail (according to Christ's prayer) after a certain time, Roman Catholics are obliged to assume that Christ's prayer was that Peter's faith did not fail after that time. Now, if p is a proposition, p certainly implies p; but it is rather surprising to find a Papal decree being made of the fact that, from the "deposit of faith" $(p, q, r, \ldots)$, is deduced, not a proposition which is implied, but not always recognized to be implied, by $(p, q, r, \ldots)$, but one of the old propositions, p itself. If Papal decrees are disguised identities, one can readily understand why they are infallible.

V.

It is conceivable that a Roman Catholic might urge that belief in a divine promise about Peter's faith is not derived from the Bible alone, but from tradition. But such an objection is irrelevant to the present argument, which is concerned with the deductions which the Vatican Council *explicitly stated,* in the passage I have quoted, to follow from Luke's report. Surely the statement that the Fathers believed in something "according to" Christ's words cannot be ambiguous. If so, it is clearly a Papal duty further to "define" Catholic doctrine.

VI.

The points of the above argument are as follows:

1. Peter's denial was a "failure of faith";
2. We assume that Christ had prescience and that his prayers were always granted;
3. Propositions (1) and (2) imply that Christ must have prayed that Peter's faith should not fail except on certain occasions (one or many), which he must have specified;[13]
4. Consequently, the deduction that Peter's faith did not fail after a certain time requires itself as premise;
5. Consequently, the doctrine of Papal Infallibility is either part of an identical proposition, or else Christ must be assumed to have prayed that an identity may be fulfilled.

It seems, then, that, if we are to be able to attach any useful meaning to Luke's narrative, we must adopt some form of the doctrine of kenosis, and admit that Christ's prayers were no more likely to be fulfilled than the prayers of ordinary mortals, and that Christ's prescience was by no means complete.

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[13] Unless Christ prayed that Peter's faith should only fail once. If the instances are quite unspecified, Christ's prayer must have been that Peter's faith should not fail except when it should happen to do so.

VII.

In the Rev. F. H. Chase's article on "Peter (Simon)" in Hastings' *Dictionary of the Bible,* the following account of Christ's promise is given (p. 761): "But Peter had been the subject of urgent supplication on his Master's part that his faith might not wholly and finally fail (ἐκλίπῃ). It is implied that the Apostle would not pass through the trial unscathed. But beyond the trial a return to former spiritual relationships is promised—a return which would bring with it the duty of 'stablishing his brethren.'" On the same page, Peter's denial is spoken of as "faithlessness"—a fact that confirms our first point.

This interpretation of Christ's prayer is certainly more conformable to a later event, where Peter, according to Paul,[14] was, in Principal Chase's[15] words, "guilty, not of false doctrine, but (as once before) of moral cowardice," and consequently, according to the same writer, of "faithlessness." But it is quite obvious that this more reasonable interpretation of Christ's prayer is quite fatal to the claim for Peter's absolute firmness in faith and infallibility after the Ascension.

VIII.

In what precedes, it has not been my intention to depreciate religion simply because of its very sparing use of logical deduction and overwhelming number of indefinables and indemonstrables. There seems, indeed, some ground for objection to the admission of primitive ideas and propositions which seem to be partly arbitrary and partly based on very slender evidence—the report, for example, derived from unknown sources, that somebody else alleged such and such a thing to have happened, other evidence for the happening of the thing being somewhat conspicuously absent. But everybody must admit the nobility of the straining after ideals which neither help us to attain bodily comforts nor put us in the way of gratifying any of the very common and mundane desires of human beings. Such an ideal was the intellectual "curiosity" of which Aristotle[16] speaks; such ideals are those of many, both now and in the past, who have made sacrifices of themselves for what they believed to be the truth; such are the exalted ethical ideals of religious persons. It is a matter for wonder and thankfulness that such ideals exist, even if a primitive credulity and hankering after magic seems always to accompany them at first. This is by no means the case with religions alone. The sciences still bear numerous traces of that primitive credulity which would make a "law of thought" of the principle of the uniformity of nature, and — as Mach and Karl Pearson have shown — of the fetishism involved in such conceptions as that of "force." Certain people have tried to abolish or explain away—in part at least—the "miraculous" element in religions, and bring religion more into harmony with philosophy and science. But a deductive theology is still a very distant ideal.

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[14] Gal. ii. 11. It may be noted that this Epistle is accepted as canonical by the Roman Catholic Church.

[15] *Loc. cit.,* p. 765.

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[16] See Prof. A. E. Taylor's *Aristotle* (No. 67 of "The People's Books"), p. 14.

A CATALONIAN PHILOSOPHER: ANTONIO COMELLAS Y CLUET.

THE name of Antonio Comellas y Cluet will always have a distinguished place in the history of philosophy, especially that of Spain, where he was deemed a laborious and illustrious thinker. He is one of the Spanish thinkers whom I was not able to overtake or discuss in the chapter devoted to "The Philosophy of Spain" in my *Studies in European Philosophy* (Blackwood, 1909), and this paper is devoted entirely to him in supplement of the treatment then made of churchly-scholastic philosophers in Spain during the last century.

Comellas found himself planted in a time in which the negations of positivism had found their way, and the critical effects of Kant had been felt. It was this atmosphere that made him feel the need to consider the possibility of science, and the legitimacy and value of scientific method and procedure. This explains the character of his great work, *Introduction to Philosophy,* which is no mere propædeutic, as the phrase might suggest, but a critical study of method; of the sources of knowledge; of the criteria of truth; of the motives or reasons of certainty; and of the bases of science, under rigid analysis. I wish to say that, in addition to my own study of the work of Comellas, I have had the advantage of the valuable study of Comellas made by another distinguished Spanish philosopher, Alberto Gómez Izquierdo, in *Cultura Española* (Madrid, 1907). Comellas cannot be said to have had the originality to create an entire philosophical system, though a synthetic organization may be claimed for his thought and its discussion of fundamental positions. Some account of these may be of interest, and I shall deal only with those points that seem most essential, making such critical comments as seem to me necessary. He did not found, and scarcely affiliated himself to, a particular school.

I.

It may be well to consider first the position of Comellas on the methodological problem. He makes three stages or periods in the evolution of science. The first of these is that of the *real,* in which man holds to being or to forces, without as yet having unfolded them. He emerges from this condition through the attractive power of the ideal, and the aspiration for truth. Comellas has, rightly I think, emphasized the emergence of the opposition of fact and ideal—as various thinkers have done since—but we must not lose sense of the slowness of the process in the crispness of the statement. Nor must we overlook, in speaking of the ideal, the retardations due to the slow-footed movements of the positivist spirit in various spheres of scientific knowledge. The second stage is that of the *attracting ideal,* wherein is seen the activity of human reason in abstraction, generalization, induction, and deduction. In the third stage, we have *the synthesis of the real with the ideal.* On this hypothesis has Comellas based the formation of science, grouping around it the various questions as to critical method. Totalizations for mind is thus what Comellas derives from the fusion of empiric fact with intellectual working and ideal. It should be observed that the three stages now enumerated form the three divisions of the work.

The position of Comellas as to universal doubt being the point of departure in scientific investigation is, that such doubt is a skeptical means to a dogmatic end (p. 33). He does not think even partial doubt is necessary as an antecedent of investigation. Nobody, he thinks, would contradict the fact that as often as we investigate things, we doubt concerning them. And yet we can, in his view, frequently see that people investigate things without doubt of them, and he gives examples of such cases (pp. 67-69). One of these is the case of trying to demonstrate an accepted truth by new arguments. One thing, I may remark, that cannot be doubted is that we doubt. There is a rational skepticism which is necessary and healthful: there is also an enervating skepticism, which weakens the mind's trust in itself. Whatever scientific knowledge or certainty may have owed to doubt, it should not be so often overlooked how much more it has owed to rational belief—belief, I mean, in those rational, self-evident, necessary principles which make fundamental appeal to our rational insight. It has been said by another distinguished Spanish philosopher, Balmez, that "certainty does not originate in reflection; that it is the spontaneous product of man's nature, in the direct working of his intellectual and sensitive faculties; and that philosophy simply examines the grounds of certainty, while recognizing that those first principles, which are the basis of all evidence, are themselves incapable of proof" (*Fundamental Philosophy,* Bk. I, Ch. III). But I may add that direct and natural certainty is, to scholastic philosophers, the basis of philosophic certainty, which is of reflective and demonstrative character. For Comellas the certain and the evident are but the support necessary to soaring toward the ideal. But the ideal is not to be sought in the works which our predecessors have left us. To no writer or generation has Deity said, Thine are the treasures of science, gather them according to the measure of thy mind, and they will be the unique patrimony of humanity (p. 81). In this Comellas spoke wisely enough, for no attempts to coordinate all human science, whether those of an Aristotle, an Aquinas, a Descartes, a Leibniz, or a Comte, can have finality, though every one of them must have great value and most helpful function. Comellas quotes interesting passages from Anselm, Albertus Magnus, Aquinas, and Roger Bacon, setting forth the doctrine of progress in science, which is thus not so entirely modern a doctrine as is often supposed (pp. 82-85). Not through our predecessors is the ideal found, but as the result, Comellas thinks, of our own search, with amplitude of thought, personal examination of issues, and scrupulous rigor of observation, taking due account of the workings of reason, and the evolution and conditions of our faculties of knowledge, whether empirical, or abstractive, or deductive (pp. 108-109). These three moments Comellas treats in this successive order: perception of an object, abstraction, and contemplation of the object abstracted; intuition of its content; and, finally, combination of the content of the object abstracted with empirical fact, wherein consists deduction. All these acts are discussed by Comellas at length, but we have only room for a few observations.

Perception he discusses in its differences as related to the corporeal world, and the phenomena of spirit; the former he refers to sense, the latter to consciousness. In respect of empiricism, he finds the methods of Mill useful. This does not keep Comellas from being independent and critical of Mill, as he is, for example, on induction (pp. 184-194), where he objects to Mill's positivist tendency in eliminating the metaphysical element from deduction, and making all the deductive sciences inductive. I may observe that there is no need to distinguish induction and deduction so sharply as is sometimes done, as they are so closely interrelated; and that critics of Mill like Jevons and Welton recognize the necessity of deduction in respect of the consequences of the inductive hypothesis as first framed. We can no more dispense with the deductions of Laplace, Lagrange, and Gauss, than with the great induction of Newton. The fruitful results of induction for knowledge must not obscure for us the splendid scope for intellectual power afforded by deduction, with its expansive effects for knowledge. Infinite being or substance purely spiritual, cannot, Comellas thinks, be direct object of abstraction; it is reached by combination of abstractions. He takes a wide view of intuition, including in it various dialectical processes; and to intuitive power and working, not to inductions based on fact, he attributes the formation of universal principles which are absolute and evident, and forms the most important factors of deductive thought. Ueberweg's *Logic* has had influence on his view of deduction, and on other matters (as for example, later, at pages 233 and 243). The foregoing matters are discussed at considerable length (pp. 155-194), but cannot here be further pursued.

II.

Then Comellas dealt also with the critical problem. He took large account of psychological processes in our powers of knowing, of the motives of human certainty, and of the nexus between idea and reality. In objective evidence he found the supreme reason of certainty, and the sure criterion of truth. The objective reality of the object as perceived was, for him, indisputable. You could not find either activity or receptivity in nothing. To say that a thing is perceivable, and does not exist, is to affirm a contradiction (p. 111). The relation between perception and reality he held to be of the most intimate kind, so wrapped in the apprehension of the object indeed that we become certified of its existence. He deduces the reality of the object, it should be said, from the application of the principle of causality to the affective sensations, but the knowledge of the object is not direct or immediate, as in the case of perceptions. In the position outlined in the earlier part of this sentence, Comellas seems to follow the medieval usage of speaking of the causation of sensation by the object; the confused and perverted medieval meanings of the phrase *species sensibilis* in that connection did so much to obscure the apprehension of sensation as a mental fact, that Comellas had done better, I think, to avoid causal emphasis, and to extricate the mental fact of sensation from physical, and set it in psychological associations. In the latter part of the sentence, the position of Comellas is much in accord with that of Maher, who says that "a sensation is in itself an elementary mode of consciousness of a cognitional character" (*Psychology,* p. 46). On the question of sensation, Comellas was largely influenced by the scholastic philosophy. Thus he held that we perceive sensible objects only by touch and sight, the other senses being affective, and by them we experience only a subjective affection, caused by the objects (p. 111).

Thought is one thing, says Comellas, the proposition "I think" is another (p. 237). He treats the truth and reality of knowledge of the outer world, by means of apprehension, as absolute and indefectible, but the truth and exactitude in the other case, where the data of consciousness are concerned, he ranges under the formula "I think" as a mode of locution more or less accurate—in fact, secondary and derivative. There seems to be some lack of clear discrimination about his treatment here. There may, no doubt, be error or inadequate apprehension when principles come to be applied, and opinion comes into play, but the function of reason in judgments should not be overlooked, nor should the fact be forgotten that there are both self-evident moral axioms, and self-evident and necessary truths of reason or intellect. And self-evidence, it has been said, "is really the only possible ultimate test of truth, and must be accepted under pain of complete intellectual paralysis. It is incapable of demonstration, since it depends on nothing else" (St. George Mivart, *Elements of Science,* p. 381). Neither in the case of self-evident truths of intellect, nor of self-evident and necessary moral truths or principles, can it be satisfactory to talk of secondary and derivative, in the language of Comellas, since they assume a character necessary, universal, absolute. This, of course, does not supersede, in the case of necessary moral truths, the need for moral training and development, in order to eliminate error and perversion in the way we hold them, and to perfect fulfilment of the functions of conscience. Comellas seems to me to connect all certainty too much with sense-perception. But there is no pure sense in man without some act of the understanding; it is never purely ἄλογον (Aristotle, *De Anima,* III, 9, 2). And I hold that there are no good philosophical grounds for the idea that sense-knowledge is more valid and direct than other knowledge. Comellas concludes, somewhat summarily and realistically, that the formula "I think" cannot be the point of departure for philosophy, since it does not relate to what he calls primordial knowledge. Now, of course, the formula "I think" cannot, as he rightly says, be the point of departure for philosophy, since it is but the ego reduced to the pure form of unity, but because this is true of Kant's blank form of thought or pure *cogito,* there was no reason why Comellas should not have better appreciated the aspects of moral certainty, the justice rendered by Kant to the moral reason, and his claims for moral value. The natural realism of Comellas seems to me to have crowded out, to too great an extent, his moralism. And so it happens that to-day we even see the emphasis of Comellas inverted by some thinkers, who make the conception of intrinsic value as found in Kant's ethics bear the weight of the whole philosophic structure. But creative idealism cannot, as it seems to me, be confined in its working to such a narrow moralistic basis, but must include in its purview the whole world of reality, fact, imagination, and thought. Meanwhile, the conception of intrinsic moral value as the clue to the ultimate nature of reality has not been shown capable of being carried out into anything like a valid or satisfying world-view. In such a world-view, both this moralistic procedure, and the nature-knowledge of Comellas, must find place, but neither of them in overweighted or one-sided manner.

Comellas takes the multiplicity and succession of spiritual acts to be facts or undoubted reality for consciousness, in which result he thinks the Kantian hypothesis of the subjective forms *a priori* of space and time to be inadmissible. He admits a correspondence between the object perceived and our idea of it, but thinks it is not absolute, and does not exhaust the reality of the object, but remains part of its content (p. 154). I must remark, however, that neither does the subject exhaust itself in this reference to an object, as a fact to be equally recognized in psychology. In the case of infinite being or pure spirit, such correspondence of the concept with the real is not necessary, he thinks, since it is no case of an object perceived, but a procedure by combination of abstractions. It may correspond to a real being by deduction (he thinks it does so in the case of infinite being), or it may be merely possible being. The objective truth and reality of our knowledge Comellas firmly holds; he thinks our means of knowing are a legitimate source of truth; neither sensible representations nor consciousness-data nor abstract conceptions are, to him, the exclusive creation of our thinking activity; they are resultants of the knowing subject and of the objects which determines and informs it. He thinks that in man the possibility of error springs from his limitation and his liberty (p. 212). The will can determine the judgment, but may do so wrongly, as it lacks security—a good hint to voluntarists. Anyhow, limitation and liberty are the immediate source of error in man (p. 213). Perhaps Comellas was here influenced by Descartes, to whom he devotes chapters in the second and third parts of his work, for Descartes made error consist in defect or finitude—our "faculty for discerning truth from error" is "not infinite." In the discussion of error, Comellas thinks certainty involves the persuasion of the truth, but not the truth itself; certainty must justify itself at the bar of reason, to which latter it must conform. The rational motive of certainty and the criterion of truth as distinguished from error, must, he opines, be found in objective evidence, not in clear ideas as Descartes supposed, unless it be in clarity of the object as perceived or seen. When discussing the view of Balmez, of which he is somewhat critical (p. 223), he sums up his doctrine on the criterion of truth in the formula: "The evident is true" ("*Lo evidente es verdadero,*" p. 222). This principle of evidence. Comellas insists, "comprehends all things evident, be they classes, or propositions, or facts, or substances, or accidents known by act of vision". (p. 222). What Comellas is, I think, really trying to bring out, albeit not so cleverly as might be done, is, that certainty is the concern of all knowledge, and that in all certainty, whether of what is external or internal, there is a real object; but he does not bring out, with sufficient clearness, that, while the general form of certainty is the same in all knowledge, the variant forms of certainty—mathematical, logical, scientific, moral, spiritual—are due to the differences in the matter involved. Comellas disposes somewhat lightly of the objection to his position that the object perceived has reality of being, by saying that, in the case of illusions and hallucinations, there is only sensitive appearance, not a perception properly so called. In all such cases of mere appearance, there is "no evidence or objective perception" (p. 229). What he defends is "the truth of the evident, the perceived or seen, but not of things apparent." False or imaginary appearances presuppose "the truth of the evident, of the perceived or seen" (p. 230). Earlier, he has insisted on the principle "the perceived is true" (p. 225) as like unto what he had said of "the evident," though he admits that, strictly taken, evidence and perception must be distinguished. Comellas, in all this somewhat hard realism, does little, it must be said, in the interest of the flow of free ideas, and the unifying of the perceptual data. It is evident that Comellas has not a little in common with what Professor Sidgwick called "the earnest, patient, lucid, and discerning intellect" of the Scottish philosopher Reid (*Mind*, 1895), to whom Comellas devotes a chapter in the third part of his work. There are some interesting differences, no doubt, but on these we need not now go out of our way to dwell. It must suffice to say that, though Comellas thinks we have means enough to distinguish the truth from error, he does not think we can fully reach the scientific ideal.

III.

Lastly, there are the critiques of Comellas on philosophical systems. These I have thought it desirable to place in a third section by themselves. But it should be observed that they belong mainly to the third "book" or division of the work of Comellas, which deals with the synthesis of the real with the ideal in twenty-five chapters. The critiques are introduced by half a dozen chapters on subjects like truth, error, evidence, certainty, and appearance, and I have spoken of those points in them which I wished to notice under the critical problem, as the most appropriate place. But it is in reference to the principles and criteria in them that the philosophical systems are examined and discussed by Comellas. The critiques are, it must be said, fragmentary, not exhaustive, but the critical work in them was done with scrupulous care and fairness, giving in footnotes the *ipsissima verba* of the thinkers concerned, whether German, French, or English, whenever necessary. Among the subjects of his critiques are, the methodical doubt of Descartes; the teachings of Reid, of Balmez, of Jacobi, of Lamennais; the skepticism of Kant, the relativism of Hamilton, Comte, and Spencer. Aristotle, Carneades, and Sextus Empiricus, have some attention, too. Some discussion of Plato and Aristotle, and also some treatment of Hartmann's philosophy of the unconscious, had already been given in the first "book." The pessimism of Schopenhauer; the eclecticism of Cousin; the metaphysical ideas of Krause; the views of Mill on induction and the nature of axioms, had all received handling in "book" second. Comellas, in his treatment of the systems, seeks to find in them confirmation of his own criterion of the true. I shall only speak of some points which seem to me of present-day interest.

Sextus Empiricus is repeatedly referred to by Comellas in connection with skepticism, a subject to which he devotes much attention. Comellas quotes (p. 305) from the *Pyrrhonic Institutes* of Sextus, wherein he says that those who think the skeptics deny phenomena do not understand their doctrines. Sextus says they do not reject things which by the impression they make upon our minds induce in us an irresistible assent. Such are phenomena. But when we examine whether the object is as it appears, we concede that it appears, but doubt whether it exists in the manner that is affirmed. Thus we concede, says Sextus, that honey has a sweet taste, because we feel sweetness, but nevertheless doubt that honey is sweet, according to the dictate of reason. With such teachings of Sextus, Comellas connects the teachings of Kant concerning the phenomenal and the noumenal, pursuing in a critical manner Kant's denial of the possibility of knowing things-in-themselves (pp. 305-315). He further quotes Sextus, who says that the skeptic does not employ the expressions of doubt in an absolute sense; he neither says that "all things are false," nor that "nothing is true," without recognizing that each of these statements has its own falsity. Sextus speaks similarly in his work directed against the dogmatists, and entitled *Adversus Mathematicos.* The affirmation of universal doubt thus goes united to doubt of that affirmation itself (p. 309). In this connection I would observe that doubt itself rests on certitude, and that, to put the whole matter more explicitly, absolute skepticism is really self-contradictory.

Comellas points out that, in the seventh book of this latter work, Sextus holds that no firm seat can be found for the negative doctrine that there exists no criterion of the truth, since to the reasons advanced for that position others equally probable can be opposed. Firmly to suspend all assent is the conclusion he reaches (pp. 308-309). Comellas also cites the passage from the eighth book of the same work in which Sextus urges against the dogmatists that, to hold that to know the truth of a thing involves necessary, infinite, and impossible suppositions, would mean that one could not with certainty know the truth of anything (p. 309). Thus there and elsewhere Comellas thinks there are indications in Sextus which point to the need of some certainty. Indeed, later, Comellas finds that Sextus at times inclines to certainty in all three moments, the empirical, the abstractive, and the deductive. This would detach him from the position of the skeptic, viewed as one "holding no form of creed but contemplating all." Ritter says that, in all this, Sextus does not give "his exposition of the skeptical doctrine as anything new, but invariably speaks in the name of his school" (*History of Ancient Philosophy,* Vol. IV, p. 273). It has seemed to me more important to dwell on the points connected with Sextus, both because they are well chosen by Comellas, and a good edition of Sextus Empiricus still remains a desideratum, and because "the skepticism which prevailed in Europe from the beginning of the sixteenth to about the close of the eighteenth century drew its inspiration, its principles, and its methods, largely from the writings of Sextus" (R. Flint, *Agnosticism*, p. 95).

As to Descartes, Comellas is critical of what he considers his subjective and skeptical tendency. But in his famus axiom, *Cogito ergo sum,* Comellas says Descartes expressly excludes from doubt his own existence because contained in his thought, and "thought," for Descartes, comprehends, he says, all the acts perceived by consciousness, save those which are by means of the bodily organism. Under "thought," moreover, are included, not only understanding, willing, and imagining, but also *feeling*. No doubt, the principle had a subjective and personal significance for Descartes, but it was, I think, rather meant, through the involved perpetual presence of thought, as a refuge or defense against skepticism, when, in the *Method,* for example, he says, "The 'I,' the mind by which I am, is wholly distinct from the body, and is even more easily known than the latter; although the latter were not, it would still continue all that it is." Descartes points out that his *Cogito ergo sum* is not a syllogism, but rests on a simple intuition of the mind (*simplici mentis intuitu*). And one need hardly say that any real doubt of our own existence would mean mental paralysis. Comellas objects that Descartes, in his discussion, confounds conception and vision: he says Descartes speaks of vision, which is a fundamental act, and then passes on to speak of conception, which is derived from it. Comellas at some length criticizes Descartes's psychology on other matters; he thinks Descartes fails to distinguish apprehension of the object from the mental expression of it. For my own part, I doubt whether the famous axiom of Descartes is so absolute as is commonly supposed; and the possibility of its conclusion depends on the truth and certainty of our intellectual operations. In making the "I think" involve and express the "I am," the axiom seems to become, in some real sort, a *petitio principii.* It seems to me noteworthy that Augustine and Aquinas had already used it in principle—the latter expressing it very clearly in his own way, and in a relative sense—but they held to self-consciousness as primitive indubitable fact. Yet Descartes is generally spoken of as if he were the first that ever entered the truth here, when what he did seems rather to have been to give it new, distinct formulation. It may be allowed, I think, that the axiom brings out that conscious personality is involved in every mental act.

In treating of the Spanish philosopher Balmez, whom I have dealt with elsewhere (as indicated at the beginning of this article), Comellas properly notes the influence on him of Descartes in respect of subjective tendency, and the influence of the Scottish school, as to the grounding of certainty in assent through irresistible inclination.

Comellas regards Reid and Jacobi as occupying similar positions on the principle of certainty. This Reid found in instinct or irresistible inclination, so emphasizing the "primary instincts of nature," and undervaluing the reflective reason; Jacobi found it in feeling, for to him reality can only be believed in and felt, not known. In both cases, the principle consisted in something distinct from knowledge. Jacobi's basis in feeling, Comellas thinks, is a weak one for the grounding of science (p. 286). He thinks like faults attach to their systems; they disavow, in part, the harmony of the universe; and they do not provide adequate safeguards against skepticism. While these general conclusions of Comellas are interesting, I add a few words for the sake of clearness. Reid and Jacobi were alike in holding an immediate knowledge before all mediate knowledge, before all inference, and all fixed and fundamental truths. Reid found a place for self-evident and intuitive truths. "There is no searching for evidence; no weighing of arguments; the proposition is not deduced or inferred from another; it has the light of truth in itself, and has no occasion to borrow it from another." He distinguished necessary from contingent truths. Though his philosophical analysis was defective, his philosophy was yet a safeguard against subjective phenomenalism. Jacobi developed his immediate knowing, which is feeling, into the two forms of perception and reason, the former for the sensuous, the latter for the supersensuous. Not through thought, but through feeling, does the actual assert itself, for Jacobi, in human consciousness. Jacobi is not like Reid, when, for him, there is no reality outside consciousness, but he reminds us of Reid in his insistences on immediate perception. They both fought for the rights of immediacy and of reality, but each in his own way. Comellas thinks skepticism has been shown not to have foundation enough to engender certainty of the truth (p. 323). In which connection I would recall what was well said by Dr. Edward Caird, that "the very logic by which the skeptic overthrows the dogmas of philosophy, implies that the mind possesses in itself the form and idea of truth. His deepest doubt reveals a certitude that transcends and embraces it."

Lamennais is criticized by Comellas for his advocacy of the impotence of human reason to distinguish the true, and to reach certainty, and for his impressive attempt to found a doctrine of traditionalism on skeptical bases, or, in other words, to take refuge in divine revelation. This, Comellas argues, would make the criterion of the true objective-subjective, and set it in an extrinsic order. Not only does Lamennais make divine revelation the principle of certainty, but, sacrificing the individual reason, he makes the common or catholic consent the means of knowing that revelation. The infallible guarantee of the primitive traditions is found by Lamennais in the human race. Divine authority is made by him the basis of the certainty of our knowledge. Common consent or collective reason is the only seal or stamp of the truth. But, in the view of Comellas, the doctrine of Lamennais has no solid foundation, since it carries no immediate evidence, nor any demonstrative force. It is impotent, he says, to reach certain knowledge of the truth, since it does not proceed from individual reason. The common consent was, to him, a begging of the question, a supposing of the very thing to be proved. The doctrine of Lamennais was, to Comellas, self-contradictory. It assumed individual reason able to be certain of the common consent as the means of knowing the divine revelation; it did not allow individual reason to reach certainty of any particular fact, but supposed it able to be certain of so general a fact as the common consent. I will only remark that Lamennais carried his skeptical basis to an extreme that was self-destructive. If you begin by making individual reason wholly fallacious, and treat individual assent as of no value, the general consent, built on such a basis, can have no value either.

Comellas has a good chapter on the philosophy of Krause, who has attracted much attention in Spain. But Comellas objects to it as giving an excessive importance to experience, and as participating in the subjection of Fichte and the intellectual intuitionism of Schelling. His criticism is based on study, not only of Krause's own works, but also of Tiberghien's exposition of Krause (in his *Introduction à la philosophie,* Brussels, 1880). The final conclusions of Comellas are, that Krause's philosophy, on one side, exaggerates the powers of the human understanding by admitting a single principle of all our knowledge; and, on another side, is opposed to its full development, inasmuch as it adopts an insufficient point of departure, making the contemplation of being the fundamental principle of all knowledge, and neglecting the empirical element in its deductions. For these reasons Comellas cannot allow the philosophy of Krause the merit of the extension, or the purity, or the solidity, of science or knowledge. Still, I do not think we can forget that it had its distinct merits, not the least conspicuous of which was his fine insistence on objective morality in law and history. But it was a mistake when Krause made nature and reason or mind coordinate, instead of, like Hegel, making nature subserve the ends of reason or mind.

Comellas is critical of Cousin's eclecticism, with its claim, by this method, to reach the whole of truth. In this I need hardly now follow him, except to say that I think he took a too external view of the eclective method—as so many have done—and this has been very clearly corrected by some recent French philosophers. I think it more needful to remark that, in the view of Cousin, truth was always present in reflection, although there might enter error too. And another point, not overtaken by the limited treatment of Comellas, is the interesting distinction rased by Cousin between spontaneous and reflective intelligence, but not satisfactorily disposed of by him (see R. Flint, *The Philosophy of History,* pp. 461-464).

Comellas objects to the relativity theories of Hamilton, Comte and Spencer, which he thinks experience does not favor (p. 370). Certainly it was absurd when Hamilton and Spencer thought we cannot know the object as it is in itself, on the ground that we cannot know it save as different from and yet related to the subject. Absurd, because knowledge that should not involve distinction is really impossible. The want of complete knowledge, which holds true of all reality, does not involve ignorance of all the real

(p. 370). It is too often overlooked, I must observe, that, if the doctrine of the relativity of knowledge be true, it must be true of the doctrine of the relativity of knowledge itself. If it is, as a theory, merely relative and phenomenal, then it cannot be known to be true. But if it be held as really true—which means that some of our knowledge is absolute—then it can no longer be true to say that all our knowledge is merely relative. Knowledge is, indeed, in a proper sense, relative, but it establishes a relation between us and the absolute, whose nature is self-revealing. While skepticism, in an absolute sense, is self-destructive, its method is not without real advantages in scientific investigation, where theoretic assumptions must be tested. I think Comellas overlooks too much this aspect of the case. The impossibility of understanding the most recondite forms of being, to which Spencer refers, proves the limitation of human knowledge, but does not, in the view of Comellas, justify skepticism (p. 370). With sure knowledge of substances, acts, and real attributes, may well be reconciled, in his view, the want of unlimited knowledge. The human understanding has, in his view, the force of which these philosophers deem it destitute (p. 374). In the three moments, empirical, abstractive, and deductive, he holds (pp. 360, 374) that we know things-in-themselves, and not mere appearances. I am tempted to add, in this connection, the words of a forgotten writer on ethics, "Men have always chosen skepticism before absurdity, when both are fairly before them; because skepticism, though itself the greatest absurdity, is of all others the most recondite and imposing." Comellas thinks the real world does not bear the sombre character which skepticism attributes to it. The harmony and mutual expansion obtaining, in the empiric moment of our knowledge, between man and the world's forces, and the vigor evidenced by man in the moments abstractive and deductive, are a manifestation of the tendency of the universe toward the ideal (p. 375). The universe, says Comellas, is not a dark abyss, into which the gaze of man cannot penetrate; it is, on the contrary, inundated with light, and allows itself to be scrutinized by our limited intelligence.

In conclusion, I may remark that such discussions as those of Comellas, with their stress on the objective aspects of truth and certainty, raise issues too much overlooked in modern subjective theories. To take one of the latest of these—that of Croce—truth is never static, to Croce, not even in logic, truth is faith, certainty of one's self, free development of one's inner power. But this subjective trueness of one's spirit can be no substitute for, or replacement of, the objective aspects of truth and certainty. If truth is faith, Croce's pure concepts are pure ideals, for faith is always an unfulfilled ideal, and truth is then never realized. But the science of Being, or the metaphysics, which Croce has discarded, is not to be disposed of in any such way, but remains the permanent core of all immanent evolution.

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LOTZE'S THEORY OF THE SUBJECTIVITY OF TIME AND SPACE.

THE philosophy of the ultimate nature of time and space determines, to a greater or less degree, the entire conception of world-order; and this again has rarely been given a more systematically thoughtful consideration than by Lotze in his *Metaphysics*. Perhaps the trend of recent thought toward some type of realism may lend interest to a brief examination of the grounds adduced by this severely logical thinker for regarding these two categories as subjective.

I.

It may serve to orientate the discussion to remark here that while Lotze agrees with Kant in taking space to be completely subjective, he dissents from Kant as to time; and as this difference appears to me to have an important bearing upon his final standpoint it will, I think, be best to invert the order of Lotze's own treatment, and so to begin with time;—here exposition, rather than criticism, is in the main sufficient.

a. To begin with, then, Lotze discriminates between "empty time," taken as having "an existence of its own ....as a power prior to all reality and governed by laws of its own,"[1] and what may perhaps best be called "concrete" or "filled time"; and here I think few will disagree with his view that the former entity is subjective; subjective, however, in the sense that such empty time is an abstract conception—"a creation of our presentative intellect.... when we think of the lapse of time.... and make abstraction of the content (*loc. cit.,* I, p. 350). Of this—the empty total image of that order in which we place events as a series—it is true that it is only a subjective form of apprehension" (p. 354). In this formal sense, "there is no real time in which occurrences run their course" (p. 343); but nevertheless (and it is here that Lotze differs from Kant) time, from another point of view, is essentially real; for "of the succession belonging to (the operation of things) itself, which makes the arrangement of events possible, the reverse is true—it is the most proper nature of the real" (p. 354). And while the problem of time remains one of the most difficult in philosophy, still we need claim no deeper reality for formal and empty time than for any of the abstract conceptions of, e. g., pure mathematics.

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[1] *Metaphysics*, I, p. 320.

But at the same time, though abstract, and in that sense subjective, it is not therefore wholly fictitious; it retains, as Lotze himself points out with regard to space (p. 258), an indubitable reality of its own. It is, thus regarded, a device, or schema, by means of which its originator, the finite mind, enables itself to comprehend a reality too complex to be seized in all its fulness; and if we take mind to be throughout all its manifestations one in its nature, then we must hold that it is always possible to endow the abstract time schema with deeper reality in one of two ways—either by filling it with concrete process-content, or by somehow attaining to a more absolute vision of reality as a whole. And therefore to say with Lotze, regarding this schema, that "there develops itself the idea of time" (p. 343), by no means implies that this idea is only, as Lotze himself regards it, a "fantastic image" (p. 350), but rather asserts the evolution of an organ of mind, which is fully analogous to that of any bodily organ; for mind is organic like the body, and rarely generates abnormalities; and as in biology, so in psychology problems of function are associated with those of development; but just at this point, perhaps as a consequence of regarding formal time as a "fantastic image," Lotze's further treatment appears to be not wholly adequate.

b. The general idea of time thus developed next becomes differentiated into past and future; finite minds, according to Lotze, on the one hand "assign themselves their position in relation to their more remote or nearer *conditions* as to what is more or less long past"; and on the other hand, "to their more remote or nearer *consequences* as to a future. . . . more or less late" (p. 343).[2]

Fully adequate criticism of this view would necessitate the formulation of a complete psychological theory of time cognition; but I can only refer to what appear to be its two principal defects. In the first place, our judgments of the past, and of the future, are here regarded as springing from, or based upon, our knowledge of conditions, and of consequences, respectively. But the recognition of conditions as such (and especially of any complex system of conditions) as being "more remote, or nearer," is at all possible only to a highly developed mind, and certainly follows, even if it be not dependent upon, a simpler time cognition; so that Lotze is here explaining a relatively simple mode of knowing by means of a more developed mode—a plainly illogical procedure. Then again if we interpret our time consciousness thus, in terms of conditions and consequences, it must be noted that every "consequence" is really itself a "condition"—is but a condition of a special kind. For Lotze's own fundamental principle that the universe is throughout systematic, plainly implies that *every* phenomenon, without exception, is at once a condition, and itself conditioned; but to assert this and nothing more, would be to leave ourselves without any criterion wherewith to distinguish one condition from another; and when again we do so distinguish, we find that the only distinction we can use, in the first instance at all events,[8] is that between "earlier" and "later." It is thus that "conditions" become determined, some as "consequents," some as "antecedents," these terms, not condition and consequence, being the proper antonyms, and a "consequence" (as indeed its etymology should suffice to show) is really nothing but a later condition. So not only does Lotze ground the simpler mode of cognition in the more complex, but further the very terms in which he explains the temporal, themselves imply time, i. e., his theory quite illogically presupposes the very problem which it purports to explain.

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[2] Italics mine.

c. The same defect is apparent from another point of view. Our relation to conditions, Lotze has said, determines the past, and to consequences, the future. I have tried to show that this explanation fails, because a consequence is itself simply one special type of condition—is a late condition. But secondly, we distinguish further (Lotze continues) not only past from future, but also, within the past itself, the more remote from the less remote; and similarly with the future. The "more remote, or nearer, conditions" correspond to the "more, or less, long past" and "more remote, or nearer, consequences" to the more, or less, late future. Now let us for the moment admit Lotze's distinction between conditions and consequences to be logically sound; even then I think that Lotze is once more explaining time in terms which themselves either presuppose time, or if they do not, then become meaningless for the purpose he has in view. For what is here the meaning of "remote"? I think it can mean only

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[8] In the higher types of knowledge, this temporal criterion is supplanted by others which are deeper and truer; but whether it is itself ever wholly supplanted by these remains a problem—indeed *the* problem.

(α) remote in time—and in that case nothing whatever is explained, for the explanation becomes at once obviously tautologous; or (β) remote in space—and this is an impossible spatial metaphor, condemned as such by Lotze himself (p. 315); and thus neither of the only possible meanings of "remote" actually supports the explanation offered by Lotze of the nature of our ideas of past and future time.

d. But in contrast with this abstract idea of time as divorced from all content, Lotze regards the succession belonging to the operation of things as being "the most proper nature of the real" (p. 354)—we must not eliminate from reality "the lapse of events in time": here Lotze returns "to complete agreement with the ordinary view" (p. 350). And thus it seems to be a legitimate question, Why should this marked contrast hold true? If empty time, the "creation of our presentative intellect" (*ibid.*), developed in the course of our commerce with reality, is merely a "fantastic image," why on the other hand should succession or the lapse of events—i. e., I take it, what may be called concrete or filled time—be itself essentially real?

I do not think that Lotze at all adequately justifies this striking diversity in his views, which (as we shall see later) has an important relation to his treatment of space. It is true that Lotze regards being as "a continuous energy, an activity or function of things" (p. 122), and also further, that while continuity need not necessarily be in itself predominantly temporal—as, e. g., the continuity of a line or of a course of thought—still a continuous *energy* or *activity* appears to be quite inconceivable apart from time. For such an activity must surely have within itself distinguishable phases or moments, and these again, merely as being such moments, and apart from the peculiar concrete content of each, have a common unifying relation to each other. For in the absence of (α) such diverse phases the activity would be wholly featureless and meaningless; while without (β) such a prevalent relation, it would lack unity; in short, the energy of being must be a unified diversity. It is, then, this indispensable relation between the moments of being—which, while all pervasive, is at the same time wholly and equally indifferent to all specific contents—that constitutes real time or succession; for in its indifference it resembles empty or abstract time, but differs essentially from it in being inseparable from the total content of real being, thus regarded as an activity.

Such a view, again, raises two fresh problems: (1) In this continuous activity of being, what *value*—what *significance*—has time? I. e., why is the temporal relation at all necessary? What is gained by thus conceiving a dynamic, rather than a static reality?—(2) In what sense can such an endless activity truly be said ever to have any *total* content? I. e., how can totality be really harmonized with continuous activity?

Both of these questions find their solution, I think, in the deeper view of reality as being not only a bare activity, but further the development[4] of a self-realizing whole, which necessarily expresses itself, as its development proceeds, in phases having always higher and higher values. Viewed from this standpoint, the time relation subsists not only between stages which are merely earlier and later—for, merely as such, why need they be distinguished at all? —but between moments which, as they appear, constantly increase in value, so that the later is also the fuller and the richer; while at the same time each moment, summing up within itself all earlier phases, is thus also a real totality, and so something more than merely a fresh aspect which might be severed and held apart from all preceding and all later developments. It is true that this general view of reality assumes each totality, as soon as it is formed, to be absorbed in a later and still richer phase; but this in no way detracts from its nature as being in itself while it exists a total, a summing-up of changes so far as these have gone hitherto. Unless we adopt some such view, the activity or energy of being becomes a mere featureless series of detached phenomena, in which some are first and some last, but all alike without reason, and therefore without meaning or value as a whole.

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[4] Development is a richer conception than evolution. In the latter the initial stages are, usually at least, regarded as being much simpler than the later; but this simplicity is really largely illusory, being due to a lack of insight into the true character of these early stages themselves, combined with an illegitimate limitation of the subject-matter apart from the developing whole.

II.

In considering next Lotze's treatment of the nature of space, it is essential to keep before us his attitude toward time—empty time being unreal, while the lapse of events, or succession, on the other hand is fundamentally real. And since time and space appear at first sight together to constitute a pair of allied categories, it would seem natural to expect that space also, like time, should have a kind of dual nature—have one aspect which is a part of true reality, together with another which is merely formal and unreal; but Lotze, on the contrary, regards space as being, unlike time, *wholly* subjective and phenomenal.

a. But I think it must be admitted at the outset that there exists some obscurity and difficulty here which arises from Lotze's phraseology; for while in dealing with time his language is quite clear and consistent, some degree of ambiguity appears to characterize all his arguments on space.

What is the form of our consciousness of time? Is it a perception, or a conception? I think the question is still debatable; Lotze, however, holds that "we have no primary and proper perception of it at all"; its apparently perceptual character being "only obtained by images which are borrowed from space" (p. 315); and this view is consistently adhered to throughout his entire consideration of time; but in his discussion of space we do not appear to be given the same clear presentation of the issues involved.

Lotze states the problem with which he is concerned to be that of "the metaphysical value of space. . . . we only want to know what kind of reality we are to ascribe to space as we have to picture it, and with what relation to it we are to credit the real things which it appears to put in our way" (p. 231). Now "space as we have to picture it" must mean, I think, "space as we perceive it," for with any other meaning its subjectivity would seem to be presupposed from the outset;—an idea proper, e. g., cannot be "pictured." This view harmonizes with Lotze's own chapter heading, "Of the Subjectivity of Our Perception of Space." But here again a further degree of exactness appears to be necessary; for by "perception," taken literally, we should mean the conscious process so called, and this again without question is subjective; so that there can remain only the object[5] of this process—i. e., the content perceived, in this instance space—about which we may inquire whether it is subjective or objective.

But to the problem as he has himself thus defined it, Lotze by no means confines his arguments, for he passes on almost immediately from "the impression of a finite extension which is presented to our senses," to the completion of this "picture" in "the idea of infinite space"; and this, rather than perceived space, itself then becomes "the matter whose truth and validity are in question". . . . "We must first try to define what space *as represented in our minds* claims to be" (pp. 232f).[6] Thus there becomes associated with the problem of the "metaphysical value of space," the further question of the "truth and validity of our idea of infinite space"; but again, there is a further complication, for in the chapter on "Deductions of Space" Lotze refers to space as "only the subjective form of apprehension evolved from the nature of our souls" (p. 276);[7] while in discussing the bearing of his theory upon things and their relations, he refers to the "active cause of our *spatial idea* in which we picture their locality" (p. 260). This last instance, however, may perhaps be regarded as merely loose phraseology, for in another connection Lotze points out that ideas themselves cannot have spatial predicates at all (Vol. II, p. 251).

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[5] The use of "object" here may be thought again to presuppose the issue; but it is used in the sense in which everything without exception, which can in any way be brought before consciousness, is thereupon an "object" for consciousness.

[6] Italics mine.

Amid this variety of terms, each with its own implications, what is now the precise issue? It appears that the validity of our idea of infinite space has after all no decisive bearing on the question of the subjectivity of space; for merely in itself "infinite extension would not have withheld us from recognizing" the reality of even *empty* space (Vol. I, p. 323). Nor is it easy to reconcile the designation of space as a "subjective form of apprehension" with Lotze's own accounts of our consciousness of spatial phenomena. Perception as a process, according to Lotze, "really does nothing"—there is in fact no "working or process at all as a means to the production of its content; it is nothing but a direct receptivity (*loc. cit.*, p. 275), so that, if space be a "form of apprehension," this same principle must surely apply: it, too, in that case is "nothing but a direct receptivity." But how is it possible to harmonize these expressions with the following description of our experience?—"We all live. . . .under the impression of a finite extension which is *presented to our senses* as surrounding us" (p. 232).

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[7] Cf. also "(Kant) was led to regard (time) equally with space as a merely subjective form of our apprehension" (p. 320); and "spatiality is only our form of apprehension" (Vol. II, p. 248).

perceptions, into which the mind had subsequently to transplant its impressions" (p. 260); and as this conception also becomes the ultimate form of Lotze's second fundamental difficulty in accepting the objectivity of space, I think it is needless to dispute his conclusion here that the "assumption that space has independent[14] existence and that things have their being in space" (thus taken as independent)[14] is inconceivable.

For the truth appears to be that Lotze's trenchant arguments are all directed against the ascription of objective reality to the merely formal abstractions—empty time and empty space regarded as existing prior to and independently of all their concrete content; and therefore his objections do not in the least concern the reality of the perceived physical universe which (as Lotze rather curiously expresses it) "our perception sees extended around us" with "clearness and self-evidence" (p. 256); and when the difficulties in Lotze's own positive theory itself are considered, I think it may be asserted that the objective reality of the perceived world may still be regarded as, to say the least, an open question; its time Lotze admits to be real; but its space he does not appear to discuss at all.

III.

Turning, then, to Lotze's own theory of space, we find that he regards "a system of relations between the realities, unspatial, inaccessible to perception, and purely intelligible, as the fact which lies at the root of our spatial perceptions.[15] When these objective relations are translated into the subjective language of our consciousness, each finds its counterpart in one definite spatial image" (p. 263),[16] and between this objectively real system, and perceived space, "there exists no resemblance."[17]

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[14] I. e., in the sense of "preexistent" or "prior."

[15] As Dr. Dawes Hicks points out, this view was held by Plato (*Proc. Arist. Soc.*, Vol. XIV, p. 18).

[16] Cf. "Every particular feature of our spatial perception corresponds to a ground which there is for it in the world of things" (p. 258).

This conception of reality is one of the fundamentals of Lotze's *Metaphysics*; and it should plainly be the task of his philosophy to attempt some explanation or description of the connection between such a non-spatial real world and that which we perceive as in space. But I think it will be found both that Lotze merely asserts that the ground of this connection is to some degree inexplicable, and that the positive theory which he does propound on this point involves very serious, if not fatal difficulties.

a. In the first place, as regards the manner in which these objective relations are translated into the subjective language of our consciousness, "its explanation," Lotze asserts, "could only be found in the peculiar nature of the soul....but it never will be found; the question is.... unanswerable....All endeavors to derive....this externality....from any possible abstract relation, which are still unspatial, between psychical affections,[18] have led to fallacies" (pp. 273f).[19] We must here "postulate as given the capacity and obligation of the soul to apprehend an unspatial multiplicity[20] as in space"; it is "compelled to contemplate these differences not merely as feelings, but owing to a reason in its own nature, as magnitudes of space" (p. 250). This, of course, may turn out to be quite true; still, it is obvious that this appeal to the unexplained "peculiar nature of the soul" implies a serious weakness in the positive arguments for the subjectivity of space.

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[17] It may be this lack of resemblance that removes what certainly appears to be a contradiction between the passage just cited and the following: "We do not traverse this perception (of space)....but only the allegation of a being that underlies it, which must be inaccessible to perception" (p. 257);—a "being" which nevertheless (I take it) is still spatial.

[18] Not here, as elsewhere, between things.

[19] I. e., presumably, a multiplicity of unspatial things; see note 18.

[20] "Spatial idea"—see above.

b. But at the same time Lotze does to some degree describe, if not explain, the relation between perceived space and the unspatial real world; and then we find that the translation of "objective relations into the subjective language of our consciousness" becomes an increasingly complex process. The "proximate active cause of our spatial idea," we next find, is not the relations "as merely subsisting between the things, but the concentration in the unity of our consciousness of effects of the things varying in conformity with them" (p. 260). But again, "It is not relations.... *between* the things, but only direct reactions which the things are subject to from each other, and experience as inner states of themselves, which constitute the real fact whose perception[21] we spin out into a semblance of extension" (p. 263); and then finally the soul combines "its occasional particular impressions in the definite situation in space in which they are the image of external objects,"—an activity which, as we have seen, is inexplicable except as being due to the "peculiar nature of the soul"; while, further, these particular impressions, as inner states of our consciousness, are wholly dissimilar to the space in which they are combined (p. 257).

But even if we concede to the soul this "peculiar nature," we must demand in the interest of reason itself, both that such a nature be not self-contradictory, and that it be capable of providing a relatively simple explanation, so far as possible, of our problems.

"What important advantage," we must ask, to use Lotze's own words, is secured "by the assumption of this enigmatic" nature of the soul? I venture to say, none whatever; for Lotze's theory becomes so complicated in its actual detail as to be in the end self-contradictory.

c. In the first place, the world of things is translated into spatial *positions*—the soul combines its "particular impressions in the definite situation in space" (p. 274); "within our consciousness the reactions (of) things expand into extension" (p. 279); "each [objective relation] finds its counterpart in one definite spatial image" (p. 263). These three statements are all consistent. But in contrast with these, we have that the soul contemplates these differences "as magnitudes of a space whose parts are beside each other" (p. 250). The inconsistency here is, I think, obvious,—things are said to be cognized first of all under the forms of situation, extension, and spatial image, which are all in the category of pure space, and then, secondly, under the category, plainly quite distinct, of spatial magnitude.

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[21] "Perception" is plainly the wrong term to use here, for Lotze has just asserted that the realities—the things—are "inaccessible to perception."

d. Then again, although there exists no resemblance between the intelligible relations and perceived space (p. 263), still both systems are in their diverse ways real (p. 258). Lotze does not question the reality of space—for our perception; but "all spatial determinations are secondary qualities, which the real relations put on for our minds only"; and thus we have a duplication of reality—a duplication, be it noted, not a grading into degrees. The question is surely permissible here, Why should reality double itself thus? What ground is there, either in the nature of reality itself, or (what comes to the same thing) in the "peculiar nature of the soul," for such a complication by which nothing whatever is gained? For if the soul is able to comprehend the whole most complex reality of space as this is perceived, why may it not comprehend the non-spatial real corresponding thereto, directly and without the intervention of secondary spatial forms? It cannot be because the non-spatial real is as such too complex to be directly apprehended, for "*each* of (these objective relations) finds its counterpart in *one definite* spatial image *to the exclusion of all others*" (p. 263)[22]—the degree of complexity is in each case exactly the same. And again, the various properties "of colors and tones," admits Lotze, "are not lost to us because we cannot satisfactorily symbolize them in space" (p. 283); so that what is gained by the substitution of spatial reality for the non-spatial is difficult to conceive.

e. But it is when the actual details of Lotze's theory of the translation of this non-spatial system into space-perception are examined, that its most serious difficulties reveal themselves. Assuming, in the first place, that consciousness or the soul is such that it is able to contemplate a certain type of feelings not merely as feelings, but as magnitudes[23] of a space, we find that Lotze now lays down further conditions. "If a consciousness which recollects its own different acts or states, experiences a number *n* of impressions of any kind in a succession which it cannot alter at pleasure; if, in the transition from each impression to the next, it experiences alterations, sensibly homogeneous and equal, of its own feeling;[24] if it abstracts from the various qualities of the impressions and only calls to mind the form under which they cohered"—all these processes or activities are necessary to create "the picture of an orderly series or system of series, in each of which between the terms $m-1$ and $m+1$ it is impossible for m to be missing" (pp. 250f).

But as a theory of the psychology of our perception of reality under spatial forms this account presents many difficulties. In the first place, the *perception of space itself* is left entirely unaccounted for—is regarded as due to some undefined "reason in (the soul's) own nature." Then it is further plain, from a careful analysis of the whole passage, that consciousness

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[22] Italics mine.

[23] See above, regarding magnitudes; but the difficulties remain, whether the theory concerns pure space, or magnitudes of space.

[24] It is these differences, in particular, which are contemplated as also magnitudes of space.

α recollects its states,
β under the form of number, and
γ of unalterable succession (and therefore of time); then between each impression thus apprehended consciousness experiences
δ alterations, which are
ε homogeneous and equal.

It is these latter experiences—not the primary impressions, but the alterations accompanying the transitions between these—which are "contemplated not merely as feelings but (also?) as magnitudes of space." But with processes and contents so complex as the theory is thus seen to necessitate, it must surely be impossible that introspection should fail to reveal them under their own proper character. Can we then discover in our experience any concrete states, or definite activities, which, while themselves non-spatial, occur in groups whose succession is fixed, and which are inseparably associated with either spaces or magnitudes of space? In the whole of non-spatial experience psychology can detect no actual content whatever such as that, when we experience the transition from one phase to the next, we thereupon become aware either of space or of spatial magnitude.[25] That the whole experience, again, is subconscious is also impossible, for its character—number, unalterable succession, abstraction, but above all *recollection*—are at once too definite and too many in number; so that psychology cannot but pronounce the phenomena which are obviously necessitated by the theory to be non-existent in reality.[26]

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[25] It does not seem to be quite clear whether the equal and homogeneous alterations in feeling are experienced as feelings, and *also* as spatial magnitudes, or merely as magnitudes alone. The first alternative would plainlv increase the psychological difficulties of the theory; but it seems to be implied by the argument on page 260.

f. Analogous difficulties which are equally serious attend the alternative exposition of this same theory which is given on page 260:[27] the "*series* of feelings of homogeneous change, experienced in the transition from the impression *p* to the impression *q* is felt as the distance *pq*."[28] Here, in the first place, a *series* is said to be felt as a simultaneity—as the distance *pq*; but the view which Lotze has propounded as to the reality of succession—of the lapse of events—makes this type of apprehension wholly impossible, for it is the apprehension of a succession, which Lotze takes to be known as real, under the subjective unreal form of simultaneity in space. Further, the essential nature of any series is such that in its apprehension as a series some of the terms or phases must be less vivid than others—must, to be apprehended at all, be remembered; but in the perception of a distance *pq*, all the elements therein—*p*, *q*, and *pq*—must be equally vivid; and thus a *serial* content, whose terms must differ in intensity of feeling, is here said to be apprehended as a spatial content, whose constituents are equal in intensity throughout.

But the most serious difficulty, which, indeed, appears to vitiate Lotze's entire theory, is that the apprehension of *distance* must necessarily presuppose the consciousness of space; the apprehension of spatial magnitude must imply the prior apprehension of pure space; and therefore even were we to admit that certain series of impressions can be thus apprehended under the form of distance, still to make this possible we should be forced to concede or presume the prior and in itself unexplained consciousness of pure space or extension. If, i. e., our consciousness of reals is (as Lotze asserts) possible only under the form of distance (or other spatial magnitude), then to what does the necessarily prior apprehension of pure space or extension correspond? Not to yet another real, for reality is one; but if not, then the perception of pure space corresponds to nothing in reality and becomes altogether gratuitous and inexplicable.

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[26] Lotze admits that these "reflections are utterly foreign to the common consciousness, (which) never has an inkling of the intermediate processes required to produce feelings" (p. 259). But this does not help his theory, which cites not the processes which produce feelings, but the *feelings themselves*; and of these reflective consciousness at least must have some cognizance.

[27] Slightly abridged; italics mine.

[28] In the use of *p*, *q*, and *pq*, there appears to be some degree of metaphor; for the "distance *pq*" cannot really subsist between impressions *p* and *q*, unless *p* and *q* are already points in space; here the meaning of *p* and of *q* taken separately, is not the same as their meaning in *pq*.

g. But that our consciousness of reals takes the form not of space itself, but of distance in space, is repeated in another important passage: "The meeting of these two actions (i. e., of the reals P and Q) in our consciousness causes.... the possibility of a comparison and reciprocal reference of the two; secondly.... the necessity that the result of this comparison should assume the form of distance in space to our perception; and finally, the magnitude of the difference felt between the two actions determines... the visual angle by which we separate the impressions of the two elements (P and Q)" (p. 264); and as we found was the case with the account already referred to (p. 250), so here Lotze describes a very complex conscious activity, and one which, again, cannot be regarded as occurring subconsciously, because the visual angle is stated explicitly to depend on the "difference *felt* between the two actions" of P and Q.

But this complexity of the conscious processes involved has further implications. That space is purely phenomenal is, as Lotze himself asserts, an assumption—not a "direct and overwhelming impression" (p. 259); and that reality is a "system of relations, unspatial, inaccessible to perception, and purely intelligible" (p. 263), is a conclusion from "reflections on the true state of the facts" (p. 259).

Thus, our knowledge of reality follows, through reflection, on our naive but erroneous belief that space is itself an ultimate real. But in the passage just cited this postulated sequence of reflective consciousness upon our naive belief is completely abandoned, and our perception of distance is there presented as being itself the result of processes of reference and of comparison which are themselves plainly only possible at all at a high level of consciousness; so that as the consequence of these complex activities[29] we obtain (α) our naive, direct, overwhelming, but deceptive perception of space, and then (β) pursuing "reflections propounded" by the assumption that space is after all phenomenal, we attain our knowledge of unspatial, imperceptible, intelligible reality. Such is the final form of Lotze's theory of space and reality. Again it must be asked, Does introspection reveal these felt actions, comparison and reciprocal reference, underlying our perception of space and distance? Too complex to occur subconsciously, they are also impossible during earliest infancy; while the spatial judgments of some of the lower animals are instinctively highly developed almost from birth, so that there is in their case no time whatever for the occurrence of the supposed comparison and reference.[30]

IV.

But in spite of Lotze's insistence on the phenomenal reality of space, and on the non-spatial character of reality, he adopts throughout his consideration of "The Formation of Our Ideas of Space" the every-day attitude of naive realism: "We presuppose the ordinary view—the world is extended around us in space; we and the things in it have determinate places in it; actions are propagated. . . . and produce a spatial image; the component parts of which have the same reciprocal positions as the external things by which they, as sensations, were produced" (Vol. II, p. 248). Although I think that this method of treating the problem is scarcely legitimate, still it is impossible to consider Lotze's psychological theory on any lines other than those which he himself chose to adopt. At the same time I do not think it necessary to do more than point out a few obscurities in Lotze's treatment of the subject.

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[29] For both comparison and "reciprocal reference" are impossible without some imagery or ideal content.

[30] These, however, must not be confused with two incontestable groups of phenomena: (*a*) the gradual formation of our developed spatial judgments; these, however, are founded on perceptions themselves vague and indefinite, yet still spatial; (*b*) "the manifold intermediate processes (both physiological and psychical) required to produce" our developed judgments; but of these we are never conscious—they are not "felt actions."

a. The spatial image produced in perception, according to Lotze, consists "in a number of excitations of nervous points" (Vol. II, p. 249); and the question thus arises, "How this fact of nerve-excitation becomes an object of knowledge for the soul." But, surely, this is a radical misstatement of the real facts of perception. Each spatial image is certainly connected in some way with excitations of nervous points; but the image *is* not these excitations. The nervous processes themselves are imperceptible molecular motions, which never appear in perception at all, whereas the spatial image has form and color and is in perception. Lotze has here plainly confused the nervous changes which are conceived by science, with the actual image perceived by means of the eye; and vision in itself has little to do with making nerve excitations "an object of knowledge." That is the work of physiology and has nothing to do with vision as such.

b. Lotze next conceives these excitations as undergoing "the transition to consciousness" (Vol. II, p. 252);[31] and since consciousness is non-spatial their spatial character must now be dispensed with, and so "the continuation of the process consists. . . . in the production of an idea—the idea of space....From this non-spatial material the soul has to re-create entirely afresh the spatial image that has disappeared"; and this it does "for unknown reasons." It would certainly be difficult to find any others to justify the general incomprehensibility of this entire process. For having first of all confusedly identified the spatial image (itself distinct from the external spatial thing) with the nerve-excitations, and having then, simply because consciousness itself is non-spatial, dispensed with spatiality, we find that the soul re-creates both the *idea* of a space, and the spatial *image* that has once existed and has disappeared. But this final spatial image cannot itself be an idea, nor can it be identical with nervous excitations, and the resultant obscurity seems to be Lotze's penalty of having abandoned, merely for the convenience of argument, his initial fundamental principle of the non-spatiality of the real. We appear, then, to have little beyond pure guesswork, rather than any philosophic assignment of relevant conditions; one attribute is added to another, suppositiously and "for unknown reasons," thus recalling the older method of "preestablished harmony"; forgetting that it is always the essential task of philosophy to construct its own harmony.

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[31] The obscurity is increased by the equivalence here of the terms "excitations" and "impressions."

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CRITICISMS AND DISCUSSIONS.

TIME AND SPECULATIVE PHILOSOPHY.[1]

In this paper I shall use the term "speculative philosophy"—used by Prof. Bosanquet to distinguish his type of idealism from that of the "mentalists" and "panpsychists"—to mean that philosophy which holds that "the view of the universe as a uniform and permanent system of natural laws is a necessary element in a rational experience."[2] This philosophy cannot "conceive how there could be a rational life without an apprehension of an objective order; unmoved by our clamor; indifferent to our moods; with which we can hold commerce only on nature's own terms."[2] In fact representatives of this type of idealism do not distinguish between reality and truth. What is real must be true and what is true must be real. By "real" they mean systematic coherence, organic unity: a thing is only real when we consider it in its relation to the whole of reality. But there are degrees of reality: we may say a thing is only phenomenal when considered in isolation, when considered as an independent existence it approaches more and more perfect reality as we understand it in its relation to the rest of existence. In other words, the reality of an important historical event, or let us say a chair, is real in proportion to its organic structure or unity. The same thing is true of our concepts or judgments: a judgment is false if it is out of relation, it becomes true and its degree of truth is determined by its organic interrelation to other judgments, not only in the present universe of discourse but for all actual and possible ones. So we may say that only that judgment which implies the whole universe is true in the highest degree. The reason why an esthetic experience is more representative of the Absolute than let us say a chair, is because in the esthetic experience there is more harmony, organization, interdependence, and organic unity.

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[1] Delivered before the Philosophical Conference, Columbia University, March 18, 1918.

[2] Creighton, "Two Types of Idealism," *Journ. of Philos.*, 1917, p. 534.

I do not question that to be able to live at all we must live in a rational system and that the criterion of truth is coherence, or rationality. But I think we may question whether it is necessary to have an absolutely coherent system of the type just described in order for us to be able to transact business, or for me to be able to communicate the thesis of this paper. I think that we are forced to admit that a judgment or an act of experience is more intelligible when seen in its relation to other judgments or acts of experience, and that the *ideal* of knowledge would be to see each and every judgment and each and every act of experience in its relations—if the relations would be static and eternal—to all and every other judgment and acts of experience. But speculative philosophy goes farther than that, it assumes that what I call *ideal* in my criterion of truth is really an already existing reality. In fact, in this view that is all that reality is, i. e., an organic interdependent unity. The unity is so complete that to speak of terms, or relations, or time, or a subject as over against an object, is to speak in terms of contradiction.

The leaders of speculative philosophy claim that a theory of reality which holds that reality is a unity, must also hold that this unity is a timeless and changeless unity. It is true that some are ambiguous on this point, as, e. g., Hegel in his relation of logic to the philosophy of nature, but most of them are very clear. If we ask them why it is that we apparently live in a world which endures in time, changes and develops, there is no answer. Or we may say, suppose you are right in showing that a rational analysis of experience leads to a conception of a static and timeless Absolute, it is still your business to show, why we should have this world of appearance, and, furthermore, what really is the relation between these two worlds. To that—if we take Mr. F. H. Bradley as their spokesman—the answer would be, we do not know, all we can say is that it is so, and the rest is a mystery.

The absurd contradictions which the analysis of time and development leads to, forces the speculative philosophers to the conception that time and development are only illusory. The best illustration of that we find in Mr. Bradley's book *Appearance and Reality,* in which he employs "Zeno's method" to prove his conclusions. He finds that the concept of continuity in the principle of causality involves empty space between the cause and effect, and also that the concept of causation leads us into infinite regress; furthermore, the fact that we arbitrarily select the cause of an event from a plurality of conditions leads him to suppose that the concept of causation is only an appearance and not a reality. But it never enters his mind to ask the question: if reality is the organic unity of appearance, does not change in phenomenon affect it? In the final analysis the speculative philosopher must accept one of the two following possibilities: first, that the causal world does affect the real world, and the real world consequently cannot be timeless; or, second, that the world which we know, the world which we experience, the world in which causality is real, is an illusion, and after all the real world remains timeless and perfect.

We also find that speculative philosophy goes out of the bound of experience and scientific logic, in its treatment of the law of identity-in-difference as a fundamental axiom of logic. It argues from quantitative and qualitative difference to identity of reality. But I may suggest that all we need in our logic of science is a postulate which holds that the world of qualitative and quantitative divergence falls into *approximate types or groups and subgroups.* In other words: that the world of discrete and divergent objects approximate the *ideal* regularities of type necessary in the logic of science. To put it in still other terminology we may state: that the postulated law of similarity or even of identity of types is only a *limit*—using the term limit in the mathematical sense. I think that we all agree that to comprehend the ground of an event, a person, a book, is to have an inkling of the system of connection in which that event, person, or book takes place, lives, or exists, and furthermore I may suggest that the understanding of the universe involves at least a presupposition that the universe is approximately an ordered and connected continuum. But to be able to admit this, does not require the admission that the relations and behavior of each and every bit of experience is definitely and precisely settled forever. It only means that every bit of experience acts and develops within the limits of the type or class to which it belongs. But in approaching the limit there are infinite possibilities of relations, e. g., that there can be an infinite number of circles drawn for each and every point between any two points of a compact series, no matter how infinitesimal the distance between them may be. Then I may say: that knowledge comprehends the approximate order and interconnection of reality, but as distinct and unique phases of real entities. And finally, the principle of continuity means that world of individuals, of philosophy, of history, of science, etc., develop and change and the Absolute which contains them be changeless? They say progress or development in general is only—as concerns the Absolute—a constant redistribution of parts within the whole, that is, one part of the Absolute may progress but the other must retrogress, in order that the unity may be in perfect equilibrium. But even that, it seems to me, involves time. And furthermore, did not progress—that is, the development of Spirit—in Hegel's philosophy play an important role? Using Hegel as an example we may ask: would the speculative philosopher be willing to say that, e. g., Hegel's analysis of the development of monarchy from a feudal state—in his philosophy of history—characterizes a decisive progress in the universe as a whole? But he answers in the negative, the Absolute never progresses. Consequently progress is also an illusion. But I may suggest that experience teaches us differently, and our logic of science—as I have mentioned before—does not require static ideal relationships. Therefore we are justified in saying that the Absolute of speculative philosophy is not a teleological or progressive unity, it is timeless; not being teleological it must be mechanical. Speaking in the strictest terms it cannot even be mechanical, because mechanism implies the principle of causality and that implies time.

* * *

I think it will be profitable to mention briefly the philosophic doctrine that appeared recently in the *Journal of Philosophy, Psychology and Scientific Methods* under the name of "Structure,"[4] in so far as it has any bearing upon our general problems.

The main thesis of this article is the same as the fundamental postulate of speculative philosophy. "The world is a rational. orderly world, independent of man's thinking or activity." The "thisness" in virtue of which the world is rational or logical, the author calls "structure"—it is "that which persists through all changes, or that which is defined in its own terms, or that which stands under, or that which has attributes, or that the knowledge of which is conclusive and final....in fact it means something absolute without meaning God,"[5] it is eternal and timeless. But there is a decisive difference between "structure" and the Absolute. Structure does not imply an all-inclusive universe of which everything that exists or can be conceived is a part. Outside of structure there is flux, activity, although not independent of it, nevertheless not identical with it. Structure is timeless, static, and eternal, but the growing residue or flux is "subject to this structure suspended in time fully as much as the displacement of its parts is subject to a structure extended in space."[6]

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[4] Vol. XIV, 1917, p. 680.

[5] F. J. E. Woodbridge, *loc. cit.*, pp. 686f.

With such conception of the universe the author of this article has the advantage over the speculative philosopher in that his theory of the cosmos has room for the postulates of causality and continuity, and even the postulate of teleology, all of which are so essential in a logic of science. For him change is a genuine reality, although change must follow definite laid-down forms or laws which are eternal and changeless in themselves.

But if we look closely into this type of cosmos and examine the change that takes place, we will find that it falls short of the change which seems to me to be characteristic of nature. The change which is possible in a world in which structure is eternal and supreme, is a change which must follow definite, inherent, unchangeable, and perfectly organized laws. There is no genuine novelty possible, but only in so far as there is a redistribution of the residue, the same matter takes up new but eternal forms. However, change and development appears to be of somewhat different character. It seems to me that we have plenty of examples where genuine novelty is developed through men's activity and ingenuity, novelty which may follow general types of development, but which also produces new organization and values which are not inherent parts of the movement, that is, not the necessary consequences of that movement, so that there is genuine spontaneity. The development of new qualities are the functions of changing human needs and not of rigid structural laws, although we must admit that the realization of these values is limited by their proximate limitations to which matter is subject. I may suggest that individuals are plastic and capable of developing new relationships, as a result of their development. The order and organization of individuals, e. g., in a society, is an order which is the result of the conduct and behavior of its individual members, and none of it existed even potentially in the structure as a presupposition of such a conduct; all we can say is that lower forms of organization have developed into higher forms of organization.

Or again in human creation we have plenty of examples of

[6] *Ibid.*, p. 682.

genuine novelty. Take, e. g., a new picture, a new book, a new philosophy, a new symphony, or even a new type of printing-machine or flying-machine, in each case we may have the same energy or mass, there may not have been any new energy created, but surely new values, new *purposive* energy has been created. A picture is more than a distribution of paints. Change for the most part is "creative synthesis," a concept developed by Lotze and baptized by Wundt.

Now let us examine the concept of structure itself and see if that is of the type we really find in nature. The author says that "structure is a *discovery and not a hypothesis*....It is met in action and practice by setting one stone upon another...."[7] The laws of thermodynamics and mechanics, the laws of biology and physiology, or the scientific laws in general are the exemplifications of structure as we find them in nature, while we have ventured to suggest that the scientific laws are only *ideal limits* or statistical averages of well-defined types or classes, according to which the elements which are qualitatively different and quantitatively discrete change and develop. Scientific laws deal with abstract characteristics or attributes of things, that is, with motion, or extension, weight, etc., as isolated properties of particular objects and not with concrete objects in their complex relations. In fact to find a "law of nature" we have to abstract from experience, leave the ground of reality, the region of concrete things, and find the functional relations between abstract isolated attributes of particular things.

If A changes at the same rate as B we say that A is a function of B and calculate the derivative which will represent the rate of change. We say that this derivative represents the law or rate of change of the body, or in other words, that this derivative stands for the relationship which exists between the two bodies A and B. But if we carefully observe the change of A and B, whether it be in a physical, chemical, or psychological laboratory, and plot the curve representing this functional change, we find that the relationship between A and B is not as absolute as the principal concept of calculus has it at all, in fact the change plotted does not at all represent a curve. What we really have between our x and y axes, is a number of points widely distributed, but yet within certain limits representing a continuously progressing curve. We are then told that the variation in the curve is due to defective instruments or to imperfect conditions,—there are so many other factors which play

[7] *Ibid.*, p. 683.

a definite role and are responsible for that variation. As the claim goes: it is not that the laws do not perfectly operate, but that there are a number of other laws which are operating simultaneously, and the result is this variation. Now that may be so, *but that is a hypothesis and a very useful hypothesis*—just as much as the hypothesis that the sun will rise to-morrow—*but not a discovered fact of experience.* Consequently I may suggest again that the postulate of continuity means only that we ought to analyze regularity in nature as far as we can, but not substitute a timeless, eternal structure or Absolute as the ground of change. The same we may say is true with the postulate of coherence which I have suggested at the beginning of this paper, as being useful and legitimate in so far as it represents an *ideal limit* toward which the actual progressive organization of experience leads; e. g., in the development of economical corporations, military organizations, religious and moral institutions, where there is more and more dependence of each and every individual upon each and every other individual. In a pluralistic world there is an actual striving toward that *ideal limit.* We select and adjust ourselves as we think it is best to move forward toward a progressive organization.

The fundamental postulate of science is that there is a sufficient reason for every happening, that is, every effect has a cause, even though there are no two effects or causes alike. But this postulate is only legitimately used in so far as by causation we mean an *ideal limit* of a contingency table which represents a classification of the degree of dependency between A and B, whether the dependency be qualitative or quantitative. The use of this definition of causation is that it puts variation as the fundamental factor in experience. We may also add that speculative philosophy as a rule confuses the postulate of causality—which, as I have said, is a legitimate postulate of science—with the category of ground and consequence. The first is an appropriate postulate in a finite and temporal cosmos, while the second implies eternal, infinite, and timeless unity. I may again repeat that the postulate of causality with its implications of continuity and uniformity is only used in science for its instrumental value and as an *ideal limit* of what really—*as far as we know*—is discrete and discontinuous in experience.

The distinctive feature of a pluralistic theory of the cosmos as over against a speculative-philosophy theory of the universe is that in a pluralistic cosmos things are connected with other things in many ways, but no single thing nor the totality of things includes everything or dominates over everything. The pluralistic cosmos is more like an individualistic society, without any Over-Individual, becoming more and more organized, while speculative philosophy claims that if we deal with the reality of realities, "everything is present to everything else in one vast instantaneous co-implicated completeness" (James).

Pluralism claims that there is nothing in life which is not complex, and that any one of its relations is only one aspect of it, or one way of looking at it. When it acts in that relation or connection it does not imply that it must act in all possible and actual relations simultaneously. For the pluralist things may act one way at one time and another way at another time, but, nevertheless, we still have a coherent cosmos in which each and every individual is a member and each and every individual builds the society: a coherent cosmos but not an organic interdependent unity.

It is in a pluralistic universe that teleological development is possible, that personality with its struggle toward the ideal is intelligible.

I may conclude suggesting a pluralistic theory instead of a monistic theory, not in order to solve the problems but rather to throw light upon the old problems and to create new ones.

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THOUGHTS SUGGESTED BY PROFESSOR PATTEN'S RECENT ARTICLE.

Not for a long time have I come upon so stimulating and deep-going an article as Professor Patten's in the April *Monist*, and I desire to set down some of the thoughts that have been suggested by it. My chief interest now is in the forming of some tenable conception of the elementary nature of things, and it is help in this direction that particularly attracts my attention. Professor Patten's view of deficit and surplus mechanisms and of the latter as relatively unspecialized (and in this connection the view of the contrasted functions of the nerves and the blood), his interpretation of dreams, the new angle from which he regards the problem of the transmission of acquired characters—all these greatly interest me; but it is the underlying conception of energy and its ultimate meaning, the view of wishes and their efficiency, their modifying and even creative role in the world of living things—it is these ideas, whether as formally stated, or as implied or at least suggested, that I propose specially to consider. A kind of metaphysic, or the incipient stages of one, seems to me to be presented. This may not be Professor Patten's chief interest in writing the article, but it happens to be mine in considering it. Of one of his special contentions he remarks that they may be regarded as "mere theory," and I suppose I must admit that it is a mere theory that I am interested in tentatively working out here.

The starting-point is expressions of Professor Patten's like the following (for the context I must refer the reader to the original article): ".... consciousness [in the simplest organisms] is a pulse passing from point to point on a surface. Its physical manifestation would be a temporary arm like the projections of an ameba. It is here, there, and everywhere in turn but nowhere has it continuity. The pulse rises at a given point and then sinks back to reappear at some other point. Each rising wave is an embryonic self quickly to be replaced by another, equally fugitive" (p. 226); "There is thus a continuity in the series [of successive forms or arms in which the wish appears] in the sense that a single wish is striving for fulfilment, but objectively considered they are a series of surface projections created by a passing pulse of energy" (p. 227); wishes are formally spoken of as "*on their physical side* surplus discharges" (p. 229—italics are mine) or "pulses of energy" (p. 233). The thought seems to be that the pulses of energy (or at least of surplus energy) are in their *inner being* wishes, the movements and the forms the movements take being simply the *manifestation* of the wishes. In other words, it is something of a psychical nature (I use the word in a loose, vague sense, but I cannot think of a substitute for it) that is fundamental, the physical side of it being derived or at least secondary.

I admit, however, that Professor Patten occasionally uses other language which looks as if the physical were regarded as the more fundamental. For example, "*on its conscious side* a pulse is a wish seeking fulfilment" (p. 227—cf. "pulses of energy are on their conscious side wishes," p. 232). More positively in this direction, fear and desire are spoken of as "*representatives* in conscious-true of the ameba as of the animal or man. The primacy of the psychical seems so far to be maintained.

Particularly interesting in this connection is what he says of structure. The *structure* of a living being is commonly regarded as something independent of the forces that operate in it or through it. Relatively speaking, it is so, and Professor Patten uses language to this effect. Wishes on the physical side are pulses of energy and not structure, he says (p. 233). He distinguishes between energy and the mechanism on or through which it acts (p. 225). But he also urges that changes of structure may arise and that these may come from the working or pressure of energy. Instead of being an ultimate, nowise the result of more primitive forces, he speaks of structure as caused by energy pulses (p. 231). He even says, "The wish creates structure" (p. 234). For all this, structure may be of different texture or material from energy, and language repeatedly used seems to sanction such a conception. For instance, he speaks of wish as becoming persistent only through structural aid, of its becoming "will" (defined as persistent wish) when "aided" by structure, of a primitive wish (as in an ameba) dying because without "mechanism to aid fulfilment" (p. 227). "The structure is our means of persistence," he says again, "the biological embodiment of primitive wishes" (p. 229). "Structure stabilizes energy, makes it move in particular directions" (p. 223). Language of this sort seems to imply that energy and structure are two separate things, however closely connected or reciprocally influencing one another.

Is there then an irreducible dualism in Professor Patten's conception at this point? I am unable to give an assured answer to the question and can only venture on a little reasoning. As already explained, he does distinctly assert the modifiability of structure. "Wishes modify structure" (p. 236). In advancing a view as to the way in which modifications of structure may be passed on to the next generation—a view very different from the ordinary one as to the transmission of acquired characters and which may almost be called revolutionary—this very clearly appears; the view is the most striking and daring contribution to modern speculative biology that I am acquainted with. According to it, inherited wishes are the central factor in inherited structure. "If wish can modify structure the difficulties of the theory of acquired characters can be avoided. Wishes modify structure, but the new structure has no power to modify germ cell structure. It is the transmitted wish, not particles of the new structure, which modify germ cell activity and hence modify germ structure" (p. 236). In other words, the wish has a dynamic character extending to the very seats of life—it is, indeed, the dynamic agent; and perhaps this is what we mean when we speak of it as energy at all—the more material term but brings the real nature of the wish to light. But if wish may modify structure (whether in the soma or in the germ cells), may so far create new structure, why may it not create structure *ab initio*—I mean, what is the theoretical difficulty in the way? It may be said that wish (energy) must in the nature of the case have something to act on—if not structure, then the material out of which structure is shaped. This may be granted and we may still ask: what is it necessary to suppose that the material is? Down at bottom, may it not be other energy? Or, to use the corresponding psychical terms, may not wish act on wish—or, speaking more comprehensively, fear and wish act on fear and wish? Pluralism, or at least dualism, is inevitable to some extent—there is no shaping if there is not something to be shaped as well as the shaper—but the difference need not be one of *kind*. Professor Patten once says, "The structure is our means of persistence, the biological embodiment of primitive wishes. The will is not an etherial something, but substantial bodily structure. It is wish objectified, not an entity dematerialized" (p. 229). Why may not this conception of will or wish be extended so as to cover what is of psychical nature in general, and this be held to be in its entire range no etherial something, no entity dematerialized, but the very pulse and life, the inner being, of matter itself—matter being but its objectification, its appearance or manifestation to anything related to it or observing it from without?

A view going so far as this may not have Professor Patten's approval, and it is admittedly tentative and theoretical, but his own daring suggestions embolden me to indulge in it here—and I may add that it is closely akin to the view of two notable thinkers, Schopenhauer and Nietzsche.

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PROFESSOR RUSSELL'S INFINITE.

In *Scientific Method in Philosophy*, p. 159, Prof. Bertrand Russell says, "In the present lecture I wish to state and explain the problem of infinity, to show how it arose, and to show the irrelevance of all the solutions proposed by philosophers."

Again, p. 179, "The difficulties of infinity are of two kinds, of which the first may be called sham, while the others involve, for their solution, a certain amount of new and not altogether easy thinking. The sham difficulties are those suggested by the etymology, and those suggested by the confusion of the mathematical infinite with what philosophers impertinently call the true infinite."

Professor Russell says the infinite is a problem in philosophy. But philosophers have been unequal to their problem. They are "impertinent" when they do not accept the work of mathematicians in the field of philosophy. As I understand Professor Russell, we get the infinite in a series and in a certain kind of number. Failure to accept the infinite as a mathematical series is impertinent.

I have no desire to be "impertinent," but I must admit that Professor Russell's infinite is not impressive. 2/7 involves a series, 285714, 285714, 285714. This is a series that repeats itself in six terms. That is, the process of dividing two by seven cannot be completed. As far as we go in the dividing, the results are clear, exact, correct, and finite. Manifestly the 2/7 is not infinite. It is less than one. The dividing is not infinite. It is simple, clear, and correct. The series is a six-term series. It is different from a one-term series. The six terms are not infinite. They are old friends, quite finite. And two or several of them will not be infinite. The mystery lies in the repetition.

If one insists that a fraction of 1 is infinite, I know of no mode of stopping him. But this much is clear. Before we can proceed satisfactorily, we must agree upon our term. What are we to understand by infinite?

Infinite is one of a verbal trinity used to designate reality. Reality is infinite, absolute, universal. These words mark different functions of reality and have been uncovered by separate lines of intelligent activity. As I understand, we owe the knowledge that reality is infinite to mathematics. Mathematics is the "look-out" on the bridge. It reports the infinite in the offing. It tells us nothing of the crew, the cargo, or the life history of the craft. What is the content of the word infinite? What does it tell us of reality?

Let us consider. Take a stick an inch long. This stick is wood. But wood is not stick. Stick is more than wood. It is wood and two ends. The ends are not wood. And yet the stick cannot be without the ends. What are the ends? The end is the complete absence of wood. A stick is wood and then the wood must cease. Both are essential. And neither is in any sense the other. Ends are not sticks. Wood is not stick. We may say the stick is wood, wood interrupted or broken. But there is no wood at all in the end. Nor can the wood be the cause of the end. In no sense is end wood, or the wood end. Yet both are necessary to the stick. That is, the stick of wood depends upon something that is not wood, that has nothing in common with wood, that lies outside and beyond wood. This is what we understand by finite. Finiteness is dependence. Dependence is that which has its existence, its *Dasein*, outside itself. It is what it is because of its other. And its other lies over against it, beyond it. The end of the stick does not enter into the stick. It is outside. And it differentiates the stick. That is, the stick as stick, as length, depends upon the end. That is, it is what it is because of its outsideness. The difference between a foot-stick and a mile-stick is in the ends. That which is not the thing, the outside, becomes important. Outsideness may be place, distance, or form.

If I offer a sample of distance, can you tell whether it is taken from the inch, the mile, or the ten miles? Outsideness has no quality. There are no marks that differentiate it. Place, distance, form are indifferent to their content. The difference is no part of the space. The space in an inch is exactly the space in a mile. We do not break it or cut it or end it. The object occupying the space is moving along the distance that is stopped. If the moving body is stopped here, it is an inch; there, it is a mile. The space on one side of the moving point is exactly like the space on the other side. We do not stop the space, but the moving body. That is, we have in space a case where the moment of negation is absorbed. Space is not affected by change, by ends, or differences.

The finite we saw to be that which is dependent upon its opposite for its *Dasein*. The infinite is that which is not subject to change, not affected by it at all. In the infinite the difference or change is *aufgehoben*, contained as a moment.

When the moment of negation ceases as difference, we get beyond the finite. We have the infinite. Space uncovers this function of reality. It was the merit of the geometricians to get this vision. It was a master vision and has brought wide service to man and mathematics.

The infinite is not any definite space, but space as not affected by interruption. Space does not absorb the interruption. It maintains itself beyond the reach of interruption. That is, as Hegel would say, space negates the moment of negation. The interruptions remain to carry on their business. Hence to set up the infinite as full reality is to practise idolatry. What we wish is an infinite that not only resists change but absorbs all change. An infinite in which change is a moment of itself, ceases to be in any sense different. Here we uncover the basis for the true and the false infinite.

Let us return to our example, 2/7. This is called an infinite series. The 2/7 is manifestly not infinite. It is dependent upon one and is less than one. The division is not infinite. It is definite, clear, correct. We get 285714, 285714, and so on as long as our patience and industry sustain us. It is a six-term series. If we take 4/14, we have the same situation. The mystery is not the 2/7, nor the division. It is rather that which the division cannot reach. Try as we may, it eludes us. That is, it is not affected by the process. It is beyond the reach of the process. It lures the process of division, and yet is utterly beyond it. It maintains itself permanently beyond the process. To this extent the process is negated. But the process of division is not absorbed. The two stand over against each other.

We reach this conclusion: The 2/7 are not infinite; the six terms are not infinite; yet the infinite is present compelling the repetition, yet remaining beyond its reach.

The case is this way: Reality is infinite. The humble fraction, 2/7, shows the infinite. This discovery we owe to mathematics. This is a high service to philosophy. Philosophers are appreciative and publicly give thanks.

Columbus discovered America, and returned to Spain to die. Is it "impertinent" in us to explore his discovery and unfold its riches? We find the infinite in mathematics. That stands. But the infinite of mathematics is a lonely gentleman. He takes no part even in the process that uncovers him. Verily "His ways are not like our ways."

It is true that we have a chapter of civilization built upon this infinite of geometry, a static stage marked by permanent separations of classes. But it is equally true that civilization has passed beyond this stage. And so the infinite has a career. There is an evolution. Reality is infinite; reality is also absolute. Further, reality is universal. And so it appears that philosophy has a task of its own. Philosophy is not ungrateful to mathematics. But it regards the work of mathematics as quite preliminary, hardly more than that of Columbus, so far as its own problem is concerned.

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INFINITY AND THE PART-AND-WHOLE AXIOM.

DEFINITIONS OF THE FUNDAMENTAL ENTITIES OF GEOMETRY.[1]

The definition of *infinity* as endlessness, or as a quantity that is greater than any assignable finite quantity, is given in all the text-books on elementary mathematics with which I am familiar, and, so far as I know, was the only one used in this science until Cantor introduced his theory of transfinite numbers. Thus defined, the term is perfectly intelligible and in accord with common sense, because every intelligent person is familiar with the fact that every magnitude is divisible, at least mentally, into an endless number of parts, or can be increased to any other magnitude by adding to it other magnitudes of the same kind, and the human mind cannot conceive how either of these processes could be brought to an end, even if it were continued to all eternity.

Modern mathematicians, however, claim to have reasons for being dissatisfied with this simple definition, and are defining infinity in a manner that not only is not simple and perfectly intelligible, but, so far as I can see, violates Euclid's ninth axiom which, in accord with common sense, proclaims that the whole is greater than its part. Thus, the author of the article on "Number" in the *Encyclopædia Britannica* (11th edition, Vol. XIX, p. 847), defines an aggregate as *infinite* when it is equivalent to a part of itself, defining equivalence as a one-to-one correspondence between the elements of two aggregates. Equivalence in this case means, therefore, equality of the number of elements in the whole and in the part. In plainer words the new definition is given by Prof. C. J. Keyser (*The New Infinite and the Old Theology*, pp. 49-50) as follows: "The concept of infinity....is this: namely, a....multitude or an aggregate or a collection of elements....is said to be *infinite* if and only if the collection....contains a part, or a subcollection, that is numerically equal to the whole." Here the term equal again applies to the number of terms, or elements, in the whole and in its part. In this definition it is assumed that the number of elements in the part of the infinite aggregate is the same as in the whole of it, so that it is possible to arrange them in a one-to-one correspondence, at the same time assuming that the part contains less elements than the whole, since otherwise it would not be a part only of the latter. The first of these assumptions violates the part-and-whole axiom, while, taken together, the two assumptions contradict each other, and are therefore again contrary to common sense.

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[1] The material of this article will be embodied in a chapter of a book on "Science, Truth, Religion, and Ethics" which I am preparing for publication.

The question then arises, What are the reasons for defining infinity in such a, to say the least, remarkable manner? In other words, Are there truths or facts that are inadequately covered by the old definition of infinity? Or, in still other words, Are we really familiar with aggregates whose parts contain as many elements as the aggregates themselves?

Before examining the reasons that are advanced for justifying a new and strange definition, it should be noted that the idea of endlessness of countable terms, or of being greater than any assignable finite quantity, is entirely left out from the new definition, and that no special allusion is made to the implication that the numerical value of each of the elements should remain the same whether they are in the whole or in its part. Evidently the framers of the new definition deemed it unnecessary to emphasize these two requirements, considering them self-evident. But then an aggregate classed as infinite by the new definition is, by virtue of its being boundlessly large, also infinite according to the old definition, while what is finite in the old classification is also finite in the new. Hence even assuming that the new definition is valid, its real value would consist in the supposedly valid claim that, when the number of elements in an aggregate is larger than any assignable finite number, its part is numerically equal to the whole. The old definition of infinity could therefore be left unchanged, merely advancing the claim that infinity possesses the remarkable ability of violating a common-sense axiom with impunity. We may, however, pass this criticism as mere quibbling about the wording of a definition.

Admitting, then, that every infinite aggregate must contain an endlessly large number of elements, let us examine the reasons that are advanced for the inadequacy of the old definition of infinity. These reasons may be reduced to three (cf. Bertrand Russell, *Scientific Method in Philosophy*, pp. 155-208).

The first reason is the relation between certain infinite series of numbers of which the following is the most commonly cited example:

$$\begin{array}{l} 1,\ 2,\ 3,\ 4,\ 5,\ 6,\ 7,\ 8,\ 9,\ 10 \ldots\ldots\ldots n \\ 2,\ 4,\ 6,\ 8,\ 10,\ 12,\ 14,\ 16,\ 18,\ 20 \ldots\ldots\ldots 2n \end{array}$$

The first series contains the natural numbers in succession, while under each of these numbers is placed its double. The number of numbers is evidently the same in both series no matter how far they are continued; hence when n becomes infinite, i. e., larger than any assignable finite number, the number of numbers must also be the same in both aggregates. But since the top series, when continued to infinity, should contain all natural numbers, both odd and even, while the bottom series contains only even numbers, the latter is a part of the former and the number of terms in it should be smaller. The number of numbers in the bottom row seems therefore to be both equal to and smaller than the number of all numbers.

In this argument there are two fallacies. The first is the assumption that the upper series can be conceived as containing *all* natural numbers. Since the series consists of countable finite numbers, and since every finite number may be increased by adding to it 1 or any other finite number, the phrase "the number of all the numbers of an infinite series" is an absurdity. As was pointed out above, for an aggregate to be infinite, whether in the new or old sense, the number of elements in it must be larger than any assignable finite number. This implies the possibility of increasing the number of terms to any extent and the impossibility of constructing or contemplating *all* of them. The *sum* of an infinite collection of terms may be a finite number, but the *total number* of terms in it is a meaningless phrase: if there were such a total number it would be finite, and not infinite. The question whether or not there are so-called *transfinite* numbers lying beyond the range of the natural series is not involved in our problem, because, even if they existed, there is no bridge by which one could pass to them by traveling along the series of countable numbers. We are dealing with simple finite numbers, and the properties of numbers which may or may not have existence outside the domain of finite numbers have no bearing on the latter. We must stick to our series of finite numbers, and must not introduce considerations of properties other than those characterizing such numbers.

The second fallacy consists in the assumption that, when continued to infinity, the lower series will contain no other elements than those present in the upper, so that eventually it must become a part of the latter. Since it is not possible to compare individually all the terms of an endless series, the only way one can tell what becomes of our two series as they stretch into infinity is to examine whether or not finite parts of the lower series exhibit a tendency to merge in the upper with the increase in the number of elements of the former. If this be done, it is readily seen that, while both series, when purposely arranged in the above manner, necessarily have the same number of terms no matter how far they are pursued, and while the number of terms common to both constantly grows the more elements we take, the number of elements present in the second but absent from the first series, also becomes greater and greater the further we advance. Thus, among the first six terms of the second series there are the three numbers 8, 10, and 12 that are not to be found among the first six terms of the first. In the group of the first ten terms of the second series there are the five numbers 12, 14, 16, 18, and 20 that are absent from the group of the first ten terms of the first. In general, the greater the number of terms taken, the greater will be the number of elements that are found in the second, but not found in the corresponding part of the first series. Since the presence in the second series of even a single element that is not present also in the first destroys the possibility of the former to be a part of the latter, and since the number of elements that are present in the second series exclusively increases with the number of terms taken, the tendency of this series ever to get drowned in the first becomes smaller and smaller the further we advance. Hence the second series cannot become a part of the first even at an infinite distance from the beginning of the two aggregates.

Another argument. The lower series may be given the following form:

$$2(1, 2, 3, 4, 5, 6, 7, 8, 9, 10 \ldots\ldots\ldots n),$$

showing that the sum of the second series is double the sum of the first for the same number of terms. Hence at infinity, too, this relation must persist. But if at infinity the second became a part of the first, the sum of the latter, when n becomes infinite, ought to have the greater value.

Still another argument. The two series may be taken to represent the manners of motion of two bodies starting to move from rest, at the same point, at the same time, and in the same direction, the first with a uniform velocity of one unit of space per unit of time, and the second with a uniform velocity of two of the same units of space per same unit of time. The numbers in the top series will then represent both the numbers of units of time the first body has been in motion and the numbers of units of space it has covered during that time, while the numbers in the bottom series will give the numbers of the same units of space covered by the second body during the same time. To assume that at some position along the two series the second merges into the first amounts to assuming that, without changing their relative velocities and directions, both bodies will after a time be at the same distance from their common starting-point. But it is perfectly evident that the second body could never be overtaken by the first, that, on the contrary, the longer the bodies move the greater must become the distance separating them, so that even after an infinite time they cannot be at the same point.

Finally, the assertion that at infinity the second series becomes a part of the first is at best based on an assumption, namely, on the assumption that there is a number expressing the total number of natural numbers, and on the basis of this assumption we come in conflict with a common-sense axiom. As the assumption is incapable of proof, one may reverse the argument, and rely on the axiom for disproving the assumption. This is just what was done by Leibniz who, relying on the inviolability of Euclid's ninth axiom, used the very same two series given above for justifying his denial of the existence of a number of all natural numbers. As quoted by Russell (*loc. cit.*), the following are the words of this mathematician: "The number of all numbers implies a contradiction, which I show thus: To any number there is a corresponding number equal to its double. Therefore, the number of all numbers is not greater than the number of all even numbers, i. e., the whole is not greater than its part." We have then the choice between a common-sense axiom and a mere assumption conflicting with each other. In my humble opinion, the choice is like that between the Rock of Gibraltar and a bed of quicksand as foundation for a castle.

Russell's attempt to answer the argument of Leibniz by replacing "greater" by the phrase "containing a greater number of terms" is futile, because the number of all numbers indicates the total number of terms in the natural series, and, since the latter consists of both odd and even numbers, the number of terms in it necessarily is greater than the number of even numbers in it. In fact, the whole difficulty of the framers of the new definition is due to confusing the number of even numbers in the natural series itself with the number of even numbers purposely placed as a new series that is in a one-to-one correspondence with the numbers of the natural series. In the first case the even numbers really form part of the natural series, but their number obviously is only one half of the total number of terms in the series, no matter how far the latter is continued, while in the second case the even numbers form an independent series which, like any other infinite series of numbers of things, may be arbitrarily arranged in a one-to-one correspondence with the natural series. In other words, if in forming the lower series we would use only the even numbers found in a given portion of the natural series, we would always have only one half enough terms to form a one-to-one correspondence with all the terms of that portion no matter how large the latter is; in this case the number of terms in the part would be smaller than in the whole, as it should be. On the other hand, in order to get such a number of even numbers as would equal the number of terms in that portion, we would have to go outside the latter, so that the second series containing elements foreign to that portion would not be a part of it. The assertion that in the natural or in any other continuous endless series of numbers the number of elements is the same in the whole and in its part is therefore, so far as I can see, erroneous.

The second reason for considering the old definition of infinity inadequate and for ascribing to infinite numbers a property that violates the part-and-whole axiom, is the identity of the number of points in all lines, regardless of their lengths. This I show in the following manner: Draw two concentric circles, and assume that a radius common to both is uniformly moving, like a hand on the dial of a clock, along the two circumferences. Every time the radius touches a point on one circumference it touches another on the other, so that when the circuits are completed and the radius has successively come in contact with all the points of both circumferences, it has touched exactly the same number of points on both of them, and no point has been touched more than once. Hence the number of points in the two circumferences is exactly the same. But since the inner circumference is shorter than the outer, the former represents only a part of the latter, and the number of points in it should be smaller. But it was just proved that both circumferences contain the same number of points. Since every pair of lines, straight, curved, or broken, can be mentally converted into two concentric circles, the equality of the number of points holds good for all lines without exception.

Usually the same proposition is proved as follows: From a point on one of the sides of a plane triangle draw a line parallel to the base. The part of this parallel within the triangle obviously is shorter than the base. Now assume that an infinite number of straight lines are drawn from the vertex to points on the base. Every one of these lines will intersect the parallel, so that the latter, though shorter than the base, must have the same number of points.

That in this argument is hidden a fallacy somewhat akin to that of the famous paradoxes of Zeno can be readily shown. Suppose we assume inside the smaller circle an infinite number of concentric circles, one smaller than the other. The lengths of the concentric circumferences will continually diminish, the last one changing to a single point coinciding with the center. But since the number of points is the same in all the circumferences, and since the lengths of the latter decrease *continuously*, it ought also to be the same in the final circumference, which is a single point. We thus arrive at the absurdity that the number of points in all lines is both infinite and equal to 1. Similarly, we may assume within the above triangle an infinite number of lines parallel to the base. The lengths of these parallels within the triangle decrease *continuously*, the last one coinciding with the vertex, which is a single point.

In order to answer this argument it is necessary to answer three the parallels to it within the triangle into the same infinite number of real parts, and not into geometrical points, because no line, no matter how short, can be reduced to a mathematical point by actual, even everlastingly continuous, division. Similarly, the radius moving along the above circumferences marks not mathematical points, but degrees, minutes, seconds, and real fractions of the latter, all of which are real lengths. The number of these is the same in all circumferences, but their lengths vary with the lengths of their radii. A radius progressing by mathematical points only would not move at all, because no number of such points, be there ever so many of them, would by addition give the smallest imaginable fraction of a degree.

The answer to the third question is now obvious. As long as the parallels, the circumference, the vertex, and the center have spatial existence, they all contain the same endless number of real, at least mentally, measurable parts, but when for the sake of mathematical argument we kill the center and the vertex we kill with one stroke all their parts and all the lines coinciding with them. There is nothing in this description that makes a part of an aggregate contain the same number of the same elements as the whole, because, while the number of the latter is the same, their values in the part and in the whole are different. And there is nothing in the above definition of a geometrical point that would invalidate any proposition in geometry, since, in accord with this definition, the mathematical point is just what the mathematician wants it to be—a position without magnitude. The derivation of the geometrical point from real space would not impart to it greater spatial reality; it merely provides it with a location.

It is hardly necessary to point out that, if the above definition of a geometrical point were adopted, a line could be defined as a part of space of such infinitesimal width and thickness that, for the sake of mathematical argument, it is considered to be unidimensional; and a superficies as a part of space one of whose dimensions is so infinitesimally small that, for the sake of argument, it is considered to have only two dimensions.

The third reason for finding fault with the definition of infinity as merely boundless greatness consists in the supposed difficulties involved in the famous paradoxes of Zeno. Notwithstanding the fact that the fallacies of Zeno's arguments have been pointed out long ago, some philosopher-mathematicians still seem to be perplexed by these paradoxes. I shall therefore put the answer to Zeno's argumentation in a form which is, in my opinion, conclusive, and which, so far as I know, has not been used before. Since the essence of the difficulties is the same in all of these paradoxes, it will suffice to treat one of them. We shall pick out the problem of Achilles and the tortoise. As quoted by Russell (*loc. cit.*, the paradox is stated as follows:

"Achilles will never overtake the tortoise. He must first reach the place from which the tortoise started. By that time the tortoise will have got some way ahead. Achilles must then make up that, and again the tortoise will be ahead. He is always coming nearer, but he never makes up to it."

The answer is as follows: Achilles is *admittedly* capable not only of motion in a general way, but of motion with uniform velocity. In other words, he is admittedly capable of covering the same space within the same time. In pursuing the tortoise he is therefore admittedly capable of progressing by *whole* paces. He may advance by fractions of a pace if he likes or needs to, but he is not compelled to do so. Hence in going after the tortoise he will make pace after pace until he is on the top of the tortoise. If Achilles attempted to perform the impossible task of counting the fractions of a pace, i. e., advancing first by one pace, then by one half of a pace, then by one fourth of a pace, then by one eighth of a pace, and so on, he would get no further than a trifle less than two paces from his starting-point, even if he kept on moving to the end of his days. Assuming the tortoise to be no further from Achilles than two of his paces, it could quietly lie down and, without the slightest fear of ever being captured by the Greek hero, "smilingly" watch him trying to verify the value of the sum of an infinite geometrical progression whose first term is 1 and whose ratio is 1/2. This may be illustrated as follows. Suppose you wish to measure the length of your room. You would get a yardstick and lay off the *whole* of it consecutively along the floor, finishing the operation, if necessary, with a fraction of the stick. But suppose you first laid down the whole of the stick, then one half of it, then one fourth of it, and so on, you would never cover the whole length of the floor, supposing its length to be no less than two yards, even if you lived to be a million times as old as Methuselah. Since Achilles is as free to advance by whole paces as you are free to advance by whole yardsticks, he is bound to catch the tortoise. The problem of infinity is therefore not involved here at all.

The résumé of this article is, that the essential meaning of *infinity* is endlessness, or being larger than any assignable finite magnitude, that this should therefore be the definition of the term, that whatever other properties infinite aggregates may possess should be given as additional characteristics, provided it can be proved that these aggregates really possess such characteristics, and that no aggregate is at present known which contains as many elements of the same value in its part as in the whole of it. There can, of course, be no objection to *assuming* the existence of *transfinite* numbers doing violence to our good old axiom, provided they are treated like the imaginary quantities of algebra, and provided such an assumption possess real merit in the theory of numbers. Whether or not this is the case, I leave it to greater specialists in mathematics than I am to decide.

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CURRENT PERIODICALS.

In *Scientia* for April, 1919, W. E. Harper, of the Dominion Observatory, Ottawa, sketches the part played by the spectroscope in widening our astronomical horizon. He dwells upon the method, the new determination of the motion of the solar system through space, the discovery of spectroscopic binaries and their orbits, and the problems of luminosity. "The structure of the universe is the problem toward the solution of which many lines of research are contributing," and "probably from none of them may we expect more than from the spectroscopic, because the data regarding the physical constitution and the motions of the heavenly bodies are secured at once."—Evolution and sexuality is the subject of E. Rabaud's contribution to this number. He deprecates the predominance of the attention paid to the morphological aspect of questions which are much more appropriately concerned with the physicochemical differentiations which cause the morphological change—differentiations which at times are almost ignored. After discussing the work that has been done up to the present on the genesis and nature of sexuality he proceeds to dwell upon what is known of its consequences, and how far the latest work throws light upon such vexed questions as sex-determination, and the importance in the evolution of organisms of a sexuality which may be not merely useless but even harmful to the well-being and continuance of a species.—E. Lattes takes up once again the story of the Etruscan enigma, of that obscure and much-discussed tongue which has been the subject of an age-long controversy among philologists. He is of the school which holds that there is sufficient material in hand to enable a sober judgment to be formed as to these remnants of Etruscan speech, and he holds the Italian gates against all assault.—Libby's *Introduction to the History of Science* gives to Aldo Mieli an opportunity of pointing out the pitfalls that beset the feet of those who attempt to give in a short compass an accurate and synthetic account of the development of knowledge and of man's conquest of nature.

In *Scientia* for May, 1919, Gino Loria begins the first of two articles on the past and present of mathematics in Spain.—Harold Thomson in his paper on "The Planet Mars" takes the opportunity of reminding all concerned that the astronomer has no special function to pronounce on the habitability of other worlds. He pays a well-deserved tribute to the systematic work of regular observers under the British Astronomical Association. He suggests that the destruction of great forest areas, the change in aspect of vast tracts from the green of crops to the red of ploughed-up soils, the contrast between the golden corn and the fallow fields, are among many of the causes which would account for markings hitherto attributed to the existence of artificial "channels." But it is only by the multiplication, digestion, analysis, and coordination of observations that we can hope to obtain a definite answer to the problem of the habitability of the planet.—G. Bohn's paper on a new orientation in biology renews the attack on the doctrines of "finalism" with which his name is associated. After sketching the general trend of biological speculation as dominated by the tendency to specialize—"We have anatomists, physiologists, and the like, but no biologists"—and dwelling on the reception accorded in Germany, "the land of illusions," to the theory of "substance-properties," he comes to the secular controversy on the hereditary transmission of characters, and points out that the primordial problem must be the determinism of characters. "A living being is not merely an aggregate of chemical substances, it is also a system of movements, and therefore a system of forces." This view of living beings and their external movements as the expression of the play of internal forces becomes in his hands a fruitful hypothesis, and leads to the substitution of "internal formative movements" for the "formative substances" of Sachs. He closes with the prophecy: Physics and chemistry were revolutionized in the last century by the conception of molecular motion; the present century will see a revolution in biology, and the external forms and movements of living beings will be regarded as the resultant of internal forces, the manifestations of the energy of living matter, and these will have become accessible to scientific analysis.

In *Scientia* for June, 1919, Gino Loria concludes his sketch of the past and present of mathematics in Spain, dwelling in the main upon the work of Echegaray, Torroja, and Garcia de Galdeano. and the revival which, under the notably successful leadership of J. Rey Pastor, has already achieved such promising results.—That radiation, necessarily present in material systems (in virtue of their temperature) is to be taken into account in modern chemical science, is the subject of a valuable paper by W. McC. Lewis, entitled "Radiation, the Fundamental Factor in All Chemical Change." He shows how from two different standpoints the same general conclusion has been reached by the work of Arrhenius on the one hand and Marcelin and Rice on the other—that the velocity constant must be an exponential function of the temperature. An increase in the internal energy of a molecule accounts for chemical velocity and the influence of temperature on the velocity constant. Whence is derived the additional increment of energy? The source is radiation. —Philology is represented in this number by A. Meillet's paper on grammatical style and the elimination of flection. He discusses the influence exerted upon the development of a language by the mentality of those who speak it, their degree of civilization, and by certain checks to that action arising from causes which are inherent in the system of the language in question, and which may affect it in quite unexpected directions.

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In *Science Progress* for April, 1919, we have fifty pages giving the usual summaries with ample references of "Recent Advances in Science."—"Recent Work on the Spectra of X-Rays," by W. H. Bragg, is an article of exceptional value and interest, in which the author remarks that now the war is over "we are all in the position of learners again, and it may be convenient to restate the first principles of the subject." Tribute is paid to the value of recent work in America on the improvement of the spectrometer used in analyzing the rays, and investigations on the law governing the conversion of X-ray energy into electron energy are analyzed and discussed. Such laws "are sure to throw light both on the processes of radiation and on the nature of the atoms from which radiation proceeds."—The effect of X-rays on living matter is the subject of a paper by S. Russ on "Growth and Division of Cells as Affected by Radiation." The effect of variation of the quantities of radiation is described. An "intrusion" of mathematics leads to the conclusion that if irradiation of a tumor results in diminution in cell-growth, the processes that govern the growth of the young cell to the mature form have been somehow or other subjected to change. What changes are set up in the metabolism of the cells after irradiation have yet to be discovered with certainty.—Ingvar Jörgensen and Walter Stiles deal with "The Scientific Aspects of Cold Storage," pointing out the direct bearing of the principles evolved in pure science on a subject of momentous economic importance. To this, among many other problems of the industrial order, it is now possible to assign a definite research basis.—In "The Ice-Age Question Solved," R. A. Marriott disinters the astronomical work of Drayson on the precession of the equinoxes. He aims at freeing "geologists from their astronomical trammels by convincing them that the dogma which has barred the way to an understanding of the glacial period is now practically removed." He begins by rehearsing the geological facts agreeing with Drayson, and among other claims announces that Drayson's one movement of the annual motion of the pole will account for the progressive decrease in obliquity and its rate, the time and duration of the glaciation, the changes in co-latitude of the stars, and the error in sidereal time. We may foresee in the near future a fine display of wigs on the green.—The defects from the mathematical point of view of the last edition of the *Encyclopædia Britannica* form the subject of an interesting and extremely suggestive essay by Philip E. B. Jourdain. It might be worth while, were compilers of encyclopedias likely to take any notice of it, to make a list of the biographies in which the eleventh and other editions were deficient. That such a list is necessary is obvious enough if we reflect that not till the last edition was there a life of Cauchy included, and not even then is there a life of, to mention but one name on such a list, George Green. γ

BOOK REVIEWS AND NOTES.

LOGIC AS THE SCIENCE OF PURE CONCEPT. By *Benedetto Croce.* Translated from the Italian by *Douglas Ainslie, B.A. (Oxon.), M.R.A.S.* London: Macmillan and Co., Ltd., 1917. Pp. xxxiv, 606. Price 14s. net.

This volume is the second of a series of four by Croce on the philosophy of the spirit—the other three being: *Esthetic as the Science of Expression and General Linguistic; Philosophy of the Practical: Economic and Ethic;* and *The Theory and History of History.* The last has not yet been published; the other three, including the volume under present consideration, have been translated into English by Mr. Ainslie.

The book is divided into four parts: I. The Pure Concept, the Individual Judgment, and the *a priori* Logical Synthesis; II. Philosophy, History, and the Natural and Mathematical Sciences; III. Error; IV. Historical Retrospect. The first two parts are more important than the last two, considered as expositions of the author's general attitude.

According to Croce, logic is the science of pure concept—pure as distinguished from the fictitious concept, or pseudo-concept. The pure concept is characterized by three properties: (a) universality and transcendence, (b) concreteness—i. e., applicability to the actual world, (c) expression—which is the quality of being enunciated in some form of language, not vocal necessarily. Examples of pure concepts are beauty, quality, final cause. Pseudo-concepts are such as lack one or more of these properties; more particularly, they are either abstract, that is, lack instances (e. g., the concept *triangle*), or they are mere class-names, lacking transcendence and universality (e. g., the concept *house,* which, being directly representative of its object, lacks a special content of its own and is of limited application). Pure concepts include their opposites—thus "beauty is such because it has within it ugliness" (p. 97); "if God had not Satan in Himself, He would be like food without salt" (p. 98). But when taken thus complete, the concepts are distinct from one another. The expression of the pure concept constitutes the judgment of definition; definition, in this instance, is true absolutely, becoming arbitrary when the content of the judgment is a pseudo-concept, as is the case with mathematical definitions.

Parallel with the judgment of definition we have the individual judgment, like "Peter is good," where the subject is a representation and the predicate a pure concept. An individual judgment implies the existence of its subject, existence being one of the attributes of the latter. Corresponding to pseudo-concepts, we have pseudo-judgments, namely, judgments of classification and of enumeration.

Now, in relation to these distinctions of concept and judgment, distinctions of knowledge appear. There is thus philosophy, which is the thought of the pure concept; there is history, i. e., the knowledge expressed through individual judgments. These two are the only legitimate forms of theory; in fact, they are ultimately identical—the individual judgment is conceptual as well as perceptual in that it contains a predicate, and on the other hand, the judgment of definition is historical as well as universal, for it always is an answer to a question individually conditioned, and the philosopher, in the standpoint that he assumes, is influenced by his temperament and the historical conditions of his time. The argument does not seem very cogent at this point; the historical conditions just mentioned concern the philosopher himself and in no way are constituents of the judgment of definition as such. There are two other forms of knowledge, natural science, depending upon group-names and using the method of classification, and mathematics, which receives expression in abstract judgments. Both of these are illegitimate forms of knowledge, for they depend on pseudo-concepts, in fact they are not forms of knowledge at all, strictly speaking, but really forms of action.

In further chapters the author takes up the topic of error, its nature and its varieties. His view of religion is of special interest; religion is according to him that form of error which consists in the "affirmation of the universal as mere representation," i. e., in the expression of a general character like "universe" through something particular, such as "personal God"; religion is false philosophy, and philosophy is the true religion. The author is particularly severe on what he regards as the error of formal and symbolic logic; he accuses them both of basing their analysis of the concept on its verbal form, pretending to "obtain thought in words." Croce almost betrays a bias against mathematics as when he says of it: "It is a devastation, a mutilation, a scourge, penetrating into the actual world, in which it has no part" (p. 370).

Croce exhibits historical affinities with Kant, whose doctrine of the logical *a priori* synthesis he regards as a philosophical discovery of the highest importance, with Hegel, particularly as concerns the unity of opposites in a concept, and with Vico, whom he admires for the importance which he (Vico) attached to the historical point of view. In his doctrine of the concreteness of the universal, our author comes very close to Bosanquet and others of the same school. The style of the work is very vivid and flowing but it suffers in its excessive dependence on metaphors and the symbolic modes of expression, in general. Speaking of the value of philosophy, he says some very good things; thus (p. 499), "Philosophy brings consolation in its own kingdom, putting error to flight....; but man is not thought alone....philosophy has no handkerchief to dry all the tears that man sheds." Croce denies that philosophy and logic are only for the expert and that they are absolutely distinct from the field of common sense: "As the hero is not outside humanity, but is he in whom the soul of the people is concentrated and made powerful, so poetry, philosophy, science, and history, aristocratically circumscribed, are the most conspicuous manifestations attained by the elementary forms of acquaintance themselves" (p. 253). And, in a vigorous statement of the view that the philosophic thinker never attains finality, he says: "To any philosopher, as to any poet, the only works of his own that bring true satisfaction are those that he has still to do" (p. 317).

Perhaps the most striking feature of the book is the relegation of natural science and mathematics from the field of theory to that of action. This attitude is based upon the view that the concepts of science and mathematics are fictitious. But to come to a specific point, it is not wholly clear why a concept like "house" should not be regarded as possessing universality; having a definite meaning, like all other concepts, it applies to a definite set of objects, but the number of these is not limited, for the concept house applies to all possible, as well as actual, houses. And in general, instead of adopting a definition of science and mathematics which is also an evaluation of them, would it not have been more desirable to distinguish them from philosophy and history by reference not to the mode of knowledge but to the subject-matter—to define, say, history, as dealing with the particular and changing elements and science with the constant and universal elements of reality? Such a definition would not prejudge the question of the cognitive value of that which it defines and indeed would allow full scope for the claims which, undeniably, both science and mathematics make upon the intellect.

The point of view in the author's treatment of logic is thoroughly philosophical and systematic. Assertions in this volume are defended by references to theses expounded and adopted in the author's other works, and theses that are purely metaphysical in purport. The argument moves with that ease—and we may add, dogmatism, on some occasions—which come from the consciousness that any given stage in the argument is completely bound up with and determined by the stages already covered.

In most forms of knowledge, there have been two stages, the philosophical and the scientific, the latter following upon the heels of the former; thus, physics, psychology, chemistry, have all been "philosophies" before, but are sciences at the present. The same movement has appeared in the growth of logical thinking. Hegel is the preeminent representative of the purely philosophical approach to logic, whereas the present tendency to identify logic with mathematics represents the gradual development of logic into an exact science. Croce is a self-conscious upholder of the philosophical approach to logic, and the present work constitutes a forceful, clear, and on the whole, notable contribution to the treatment of logic as a philosophical study. Δ

A DEFENCE OF IDEALISM: SOME QUESTIONS AND CONCLUSIONS. By *May Sinclair.* London: Macmillan and Co., Ltd.; New York: The Macmillan Company, 1917. Price, 12s. net.

This entertaining volume of essays opens with a chapter on the Pan-Psychism of Samuel Butler. Miss Sinclair traces out Butler's destruction of the theory of "personal identity," and discusses his view that habit and instinct are but memory and that both presuppose knowledge and volition on the part of the individual that displays them. Butler's theories and those of the new psycho-analytic school stand in an interesting relation. Butler, of course, held that the only sane and perfect life is the unconscious life. The psycho-analysts, on the other hand, seem to assume that we must live consciously if we would live well. An interesting account is given of the conceptions made use of by the psycho-analysts and it is shown that Butler's work helps to an understanding of some of the features of the investigations now being undertaken by this school of psychologists.

Miss Sinclair is very happy in her treatment of mysticism, the chapter entitled "The New Mysticism" being quite a graceful study of the subject. Especially interesting is her discussion of the relation between mysticism and monism. Much trouble is taken to show that it is not the case that "Monism is the offshoot of mysticism, a disease of thought reverting to a savage ancestry" (p. 277) but rather that mysticism owes much more to philosophy than philosophy could ever owe to it. But another aspect of mysticism is also treated, and it is this aspect that is responsible for the increase of interest in the subject which is to be found at the present time. The results of psychoanalytic investigations are applied to the experiences of such mystics as Lady Julian of Norwich, St. Catherine of Genoa, St. John of the Cross, and St. Teresa. We cannot but feel that the interpretations of their religious experiences offered must make them turn in their graves. But it is intensely interesting subject, and the treatment of certain religious experiences in the light of modern knowledge of abnormal psychology seems to be a step in the direction of a healthier point of view with regard to mysticism and the various problems involved.

But the reader to whom the subject of mysticism does not specially appeal may turn to other topics. There is a chapter on vitalism, a chapter on psychology, one on pragmatism and humanism, and one on the new realism. The discussion of the new realism is light and amusing: it is a pity that the treatment of some of the most important points is not as full as the eager reader might desire. Reference is made to the work of Mr. Russell, Professor Whitehead, Professor Alexander, and the American Six Realists, who are amusingly compared to a colony of the Young Men's Christian Association. But why is Mr. Russell's treatise *The Principles of Mathematics* referred to continually as *Principia Mathematica,* which is the name of Mr. Russell and Professor Whitehead's logic? Emphasis is rightly laid on the importance of the method employed in the new realism. Once again it is explained that in the idealistic philosophy, formal logic could not cope with mathematical deductions, and so idealists condemned mathematics. It is indeed stated that "all idealisms, constructive or destructive, are based on the ultimate inability of mathematics to defend its own position" (p. 179). In the course of her defense of idealism our author has therefore to show that, even now, no satisfactory account can be given of infinity and continuity and the various conceptions with which mathematics deals. And in this endeavor she does not succeed. First an account—from the point of view of an idealist, be it remembered— is given of the work of the mathematical logicians on continuity and infinity. In an easy style, our author suggests the kind of way in which Cantor, Russell, and Whitehead maintain that space and time are no longer internally refutable: but one feels that, in spite of brave attempts, it may still be a mystery to some readers how exactly the arguments run. To appreciate the cogency of such arguments, arguments which do in fact establish the thesis that space and time are not internally refutable, some slight knowledge of the modern theory of series is needed, and this is not given in the discussion: the result is that the man in the street is puzzled and the logician is unsatisfied. As a whetting of the appetite for further information, this light-handed treatment of difficult subjects may be useful. It is amusing to see the extraordinary and paradoxical conclusions at which philosophers can arrive when they try to treat mathematical subjects—which have of course a method of their own, adequate to deal with them—with the methods of the idealistic school. There must be some innate perversity in the minds of nearly all human beings that renders them unwilling to look at the problem of the infinite with moderate carefulness and good-will. Otherwise it would not have been left to the nineteenth century to produce the theory of infinity. And it would almost seem that it was not lack of knowledge of logic but something more fundamental which was responsible for the delay. For, even now, when the subject is ready to give up the secrets of the infinite to any one who takes the trouble to look into it, we find quick and capable thinkers arriving at the most nerve-ruining results about it. Thus our author arrives at five "fine, flourishing contradictions" (p. 256):

1. the contradiction of the infinite regress;
2. the contradiction of the non-serial series;
3. the contradiction of the positionless position;
4. the contradiction of the non-spatial spaces and non-temporal times;
5. the contradiction of the finite infinite.

Who would attempt to boil potatoes with the help of a knowledge of Greek, or to attack the problems of sociology with the apparatus of chemistry? Why then treat the technical developments of modern mathematical logic with the all-embracing intuitions of the idealistic philosopher?

Other aspects of the new realism are considered, especially the question of the externality of relations. Many a subtle and difficult point is lightened (if some are obscured) by an amusing jest or a pretty phrase. An exposition of what is called "The Monistic Theory of Reality" is given and Mr. Russell's criticism of the monistic theory of truth is examined and pronounced unsound, but as it seems to the reviewer for insufficient reasons. But in spite of her treatment of the new realism, Miss Sinclair has produced an amusing and in parts an interesting book—a book any philosopher would like to read on a Sunday afternoon. DOROTHY WRINCH.

SLAV ACHIEVEMENT IN ADVANCED SCIENCE. By *Branislav Petronievics*. Pp. 32. London: The American Book Supply Co., Ltd., 1917. Price, 1s. net.

After the Renaissance the order in time in which nations took part in continuing the work of the ancient Greeks is: Italy, France, England, Germany, Russia. Dr. Petronievics shows in this pamphlet that "not only Russia can boast of men of science comparable to the greatest among the peoples of Western Europe, but some are to be found even among the other Slav nations" (p. 5). The four men dealt with at some length are the Pole Niklas Kopernigk (Nicolas Copernicus, 1473-1543), the Russians Nikolay Ivanovitch Lobatchevski (1793-1856) and Dimitrije Ivanovitch Mendeljew (1834-1907), and the Serbo-Croat Rudjer Josif Boshcovic, usually known as Roger Boscovitch (1711-1787). The transcription of names is the author's. It is interesting that (p. 9) Copernicus, in his theory of the earth's daily motion about its axis, was, "as he himself acknowledged, following in the footsteps of the ancient Pythagoreans. His second principal theory, however, that the earth's movement around the sun together with all the other planets, was almost entirely evolved by himself." In the substitution of what Bailly called "a certain probability of the mind felt by a small number of philosophers" for that of the senses (p. 9), he retained many of the ideas of the ancients. The account of the system published by Boshcovic from 1745 to 1758 given on pp. 13-15 is exceedingly interesting, especially in connection with modern work on the exact formulation of the logical principles of physics, and comparatively unknown. Also the accounts of the work of Lobatchevski on non-Euclidean geometry (pp. 19-22) and of the periodic law of chemical elements (pp. 25-30) are well and clearly written, especially the latter. Of course there are many other Slav men and women of science who are perhaps of not quite such great importance (p. 32). There are a few critical remarks which may be made. In the first place, the distinction that the author draws between scientific value and philosophical value (pp. 6, 16, 23, 31) does not seem quite valid. There is really no special domain of inference open to philosophers but closed to men of science and a proposition cannot strictly be false in science and true in philosophy. In the second place, Leibniz's law of continuity does not seem correctly stated on p. 13. There is a misprint for Beltrami's name on p. 18. φ

BEETHOVEN. By *Romain Rolland*. Translated by *B. Constance Hull*, with a brief analysis of the Sonatas, the Symphonies, and the Quartets by *A. E. Eaglefield Hull*. London: Kegan Paul, Trench, Trübner and Co., Ltd., 1917. Pp. xx, 244. Price, 2s. 6d. net.

This well-written and well-translated book consists of Rolland's short account of the life and extracts from some of the letters of Beethoven. To this is added an analysis of the musical works by the editor. The book is completed by a bibliography, a classification of piano sonatas, and a complete list of works. There are four excellent illustrations. φ

A MANUAL OF MODERN SCHOLASTIC PHILOSOPHY. By Cardinal *Mercier* and Professors of the Higher Institute of Philosophy, Louvain. Authorized translation (eighth edition) by *T. L. Parker* and *S. A. Parker*, with a preface by *P. Coffey*; Vol. II: Natural Theology (Theodicy), Logic, Ethics, History of Philosophy. London: Kegan Paul, Trench, Trübner and Co., 1917. Pp. xvi, 551. Price 10s. 6d. net.

This is a text-book for colleges, written from the Thomist-scholastic point of view in philosophy. The first section of the book—on Natural Theology—is written by Cardinal Mercier and deals with the topic of God: His existence, nature, activities, and work. In going through the arguments put forward, the reader cannot help feeling that the recent discoveries in mathematical logic on the definition of infinity make necessary a reconsideration of the proofs for God, in so far as these assume that a series—whether of causes or of perfections—must have a first or a last term. The section on Logic is also written by Cardinal Mercier, its subject-matter is stated to be the intellectual processes, its purpose, the discovery of the conditions under which these processes lead to the apprehension of truth. The most interesting of all is the section on Ethics (written by A. Arendt and J. Halleux). Here socialism the institution of the family, the nature of the State, and other similarly urgent problems are discussed in a stimulating fashion. In the section on the History of Philosophy (by M. de Wulf), prominence is given to the medieval period; notice is also taken of non-Western schools of philosophy, like those of India and China, and there is a brief treatment of contemporary philosophy, with a discussion of Nietzsche, Bergson, and others. The book closes with a synopsis of the theses presented in both volumes of the manual, a glossary of philosophic terms, an index, and an appendix. Δ

BOOKS RECEIVED.

Lossky, N. O. The Intuitive Basis of Knowledge: an epistemological enquiry. Authorized translation by N. A. Duddington, M.A., with a preface by Professor G. Dawes Hicks. London: Macmillan and Co., Ltd., 1919. Pp. xx, 420. Price, 16s. net.

Bertram, A. In Darkest Christendom, and a Way Out of the Darkness. London: G. Allen and Unwin, Ltd., 1919. Pp. 256. Price 7s. 6d. net.

Mary W. Calkins. The Good Man and the Good. An Introduction to Ethics. New York: The Macmillan Co., 1918. Pp. xx, 219. Price, $1.30.

George A. Barton. The Religions of the World. Chicago: The University of Chicago Press. [1917.] Pp. x, 349. Price, $1.50.

Ludwig Stein. Philosophical Currents of the Present Day. Translated by Shishirkumar Maitra, M.A. Vol. II. Calcutta: The Calcutta Univercity Press, 1919. Pp. 237-393.

William E. Hocking. Human Nature and Its Remaking. New Haven: The Yale University Press, 1918. Pp. xxvi, 434. Price, $3.00.

George H. Lepper. From Nebula to Nebula. (Fourth edition, revised and enlarged.) Privately printed, 1919. Pp. 401.

Henry Rutgers Marshall. Mind and Conduct. New York, Charles Scribner's Sons, 1919. Pp. viii, 236. Price, $1.75.

OBITUARY.

It is with deep regret that we chronicle the death of W. Max Müller, who lost his life at Wildwood, N. J., on July 12, when taking his daily swim in the ocean. Dr. Müller was born at Gleissenberg, Germany, May 15, 1862. After studying in the universities of Leipsic, Berlin, and Munich, and taking his doctor's degree in the University of Leipsic, he came to the United States in 1888. He soon became known as one of the foremost Orientalists in the country. Among his contributions to various periodical publications one of the most recent was his paper on "Noah and His Family" which appeared in *The Monist* for April, 1919, under the pen-name M. Milman.

As we are going to press the sad news reaches us of the death of Mr. Philip E. B. Jourdain, our associate editor in London. Mr. Jourdain died at his home in Hampshire, England, October 2.

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